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PREVENTIVE MAINTENANCE AS WAY TO REDUCE COSTS

THREE men paying special attention to plant housekeeping in important industrial organizations tell us in this article what their ideas are on the best means of prosecuting this work. The consensus of opinion is that prevention is better than cure. Cost savings extend far beyond the mere cost of maintenance work and pervade the whole fabric of industrial costs. On final analysis, preventive maintenance pays its way.

BELIEVING that the industrial benefit which has attended the extension of modern methods and modern machines and other equipment throughout our manufacturing fabric could be largely augmented through more intelligent care of equipment and processes and men than is now general, THE IRON AGE asked a number of leading exponents of "good plant-keeping" for an expression of their views on this subject. Some of their replies are carried in the succeeding paragraphs; others will follow later.

Four main ideas, from their very character somewhat overlapping, seem to pervade the expressions of those who have contributed to this discussion. Briefly paraphrased, these are:

Analyze in detail the duties to be performed. Plan everything in a way to reduce costs.

Watch all equipment and processes, in an effort to anticipate the need for renewal or replacement.

Organize on a basis to provide preventive maintenance.

In the set-up thus outlined, it is emphasized that mere localizing of the maintenance effort will by no means fulfill requirements. The scope of the endeavor is far broader than that. Reduction of costs does not envision merely maintenance costs—it has to do with all elements of cost which can be reached by intelligent planning of the "plant-keeping" effort. In following this line of attack it may impinge upon the province of the production engineer. Well, so be it, if the net result be such as to justify it.

Do Not Let Trouble Arrive

And forestalling need for renewal or replacement of a machine or a machine part goes far deeper than merely watching to prevent a physical breakdown. It means looking ahead to the time when obsolescence enters. It involves weighing the relative merits (not merely costs) of a major repair against an entirely new piece of production or auxiliary equipment—perhaps a radical change in design or method of operation. That is where the production man may find his field invaded.

But let our contributors speak for themselves.

E. C. BRANDT
Westinghouse, at East Pittsburgh

Three are here quoted in some detail. They are Robert W. Walton, manager, service department, Shepard Niles Crane & Hoist Corpn., Montour Falls, N. Y.; E. C. Brandt, assistant works manager, Westinghouse Electric & Mfg. Co., East Pittsburgh; Harry W. Benton, plant engineer, Pratt & Whitney Co., Hartford, Conn.

And Alfred Vaksdal, plant engineer, Corning Glass Works, Corning, N. Y., says: "Any plant engineer who will take the trouble to analyze in detail the duties and responsibilities of his maintenance organization will find many ways whereby he can reduce production interferences and cut costs. When this is done, the problem of purchasing new equipment will solve itself."

Cost Reduction Held a Main Requirement

"REDUCTION of costs in maintenance work," writes Mr. Benton, "is, to my mind, the big field for progress in manufacturing plants.

"The first duty of a manufacturing plant or industry is to produce profit or dividends for the owners. Involved in this process of changing raw materials into a finished product, and the sale of the product so as to make a satisfactory profit, are many things. We must recognize the fact that the workmen in industry must receive for their effort a fair compensation, so that they can maintain and conduct their homes and families satisfactorily. There are seemingly countless expenses involved in the operation of any industry, all of which must be included in the sale price of the product. Therefore the reduction of costs is important, and always will continue to be an important element in industry.

"When costs are reduced in industry it affords possibilities to:

Larger dividends to the owners.

Reduced sale price of the product, which in turn means more sales, and more work for employees.

Increased production may mean more buildings, more equipment, all of which in turn mean more business and more work with the associated activities, more money in circulation and opportunities for profits in several industries.

Increased rate of pay to employees.

"One could enlarge on the betterments possible when costs of operation are reduced in industry. In fact, there have been numerous cases when this very fact was forced upon the management, and it was realized that, if manufacturing costs could not be reduced, that industry would fail.

R. W. WALTON
Shepard-Niles, Montour Falls, N. Y.

"It is my opinion that the non-productive departments in plants offer today the real worth-while field in which to devote efforts toward cost reduction. There is abundant opportunity for the best effort and ability of all in this work, whether it be the development and application of a budget system of cost control, or a change in shop methods or equipment.

"If we accept it as a fact that industry and the genius of man have reached a limit, then we may settle down to the belief that progress is impossible and we do not require new equipment in industry. Such an idea, however, is absolutely opposite to the facts. The most fertile element in all the world is the mind of man. And just as we have progressed in the past, and are progressing today, so will the future add to the history of human progress and achievement.

Prospective Savings to Justify Investment

"It is, therefore, evident that, if we apply ourselves to the task of cost reduction in maintenance work, we will find new equipment necessary. And we will also find the [purchase] cost of new equipment justified by the [operating] cost reduction resulting therefrom.

"In one of my own experiences, an investment of $50,000 in new power-plant equipment made possible a reduction in power-plant operating costs of $67,000 a year, as shown by operating records.

"Such experiences and results are evidence that much has been accomplished. But as we realize the exact knowledge we have acquired from the experiences to date, together with the reliable data and facilities available with which to work, we conclude that what has been done is only a stimulus that urges us to the task of even greater accomplishment today. And the accomplishments of today are stepping stones to the triumphs of tomorrow."

Organization for Preventive Maintenance

"INDUSTRIAL maintenance throughout our American industries," says Mr. Brandt, "is a problem, not only in manufacturing plants, but in maintaining our buildings, property, bridges, etc. Having been responsible for this activity in the Westinghouse company's main plant at East Pittsburgh for a number of years, I have naturally formed some very concrete opinions as to maintenance requirements. I am quite certain after three years' trial, that the Inspection Department for Preventive Maintenance, which I have organized in our plant, has shown the greatest economies I have ever experienced.

HARRY W. BENTON
Pratt & Whitney, Hartford

"I also believe this set-up would be far reaching in having to do with anything which is to be maintained—even our cities and their requirements, such as sewers, streets, paving, bridges, public buildings, etc., and our railroads, with their tracks, roadbeds, etc. And when we consider our industrial plants, it has been definitely proved that preventive maintenance is the most outstanding thing we have to consider.

"In this set-up we do not allow anything to go to rack and ruin and require complete overhauling. We have a group of highly trained inspectors lined up whose duty it is to know each one of their particular lines thoroughly, and see to it that they are properly maintained and kept in efficient operating condition at all times.

Correction of Minor Faults Prevents Major Failures

"There is a point where economic maintenance must occur. It is not the point where corrosion and deterioration take hold of a building or any of its manufacturing facilities; but it is the place where little details, which are subject to wear and tear, weather conditions and the natural wearing elements which destroy property, must be cared for. It is at this time that the inspection men order the repairs made and note that, if a preventive is not applied at once, more expensive maintenance will be required later.

"Any one who will take time to learn what the smaller expenditures day in and day out mean as compared with major maintenance items, can readily see that inspection for preventive maintenance is one of the outstanding things we must inaugurate, if we are to establish the highest degree of efficiency and lower costs. The results are that our property and equipment are kept in better shape, our housekeeping is outstanding, our workmen are better satisfied and the general results are what we are all hoping for at all times—more efficient operation, prevention of waste, greater safety and a better place for us all to work."

To Keep Everlastingly in Touch with All Factors

MR. WALTON expresses his belief that the progress of maintenance in industry "will be in direct proportion to the recognition of the intimate relation between proper maintenance and plant efficiency, quality of product, the firm's reputation, sales resistance and finally, profits. Maintenance is generally understood to apply to mechanical equipment, jigs, tools and fixtures. But its ramifications extend to heating, lighting, ventilation and sanitation, and thus the efficiency, not only of the machines, but of the workmen as well, is affected.

"Its aim should be efficiency and prevention rather than repair. A piece of properly maintained equipment should never lose its accuracy or efficiency. It may become obsolete and have to be replaced, but it should not break down and stop production.

"Intelligent inspection carried out regularly, reported accurately and recorded carefully, is absolutely necessary, to uncover the effects of wear in its earliest stages and to prevent disaster later. The inspection must be intelligent or it is time wasted. It must be regular or it is soon neglected entirely. And unless it is reported and recorded it loses its importance to the inspector, and does not enable the executive to get a comprehensive picture of the condition of his equipment or to fix responsibility for trouble.

Data Available Must Be Adequate

"That inspection may be done intelligently, inspectors must understand the equipment thoroughly. This makes it necessary for them to have access to carefully prepared diagrams, cuts and instructions on the lubrication, adjustment and operation of the equipment. This information must naturally be furnished by the builder of the equipment. It must be clear, simple and complete, and the importance of copies of it being in the hands of the maintenance force, instead of simply being filed among office records, cannot be over-emphasized.

"It is to the mutual interest of the builder and the user that the equipment perform with its greatest efficiency. And it is as incumbent upon the builder to maintain a service department, capable of giving advice and help to the user, as it is for the user to provide a maintenance force to care for the machines.

"Inspections, reports and records are futile if they become an end in themselves.

(*Concluded on page* 545)

MAKING SUBSTANTIAL FLOORS

By THOMAS J. FOSTER
Chairman, National Bridge Works, Long Island City, N. Y.

A STEEL framing system known as "Steelmode," developed by the Housing Co., Boston, is described by that company as follows:

Specially fabricated steel shapes, in lengths required, are used for the posts, sills, girts, plates and lintels. These members are fastened together by bolts through holes provided at 4-in. intervals. (See Fig. 14.)

Each part weighs less than the wood it displaces. No hoists are necessary. No special tools are required with Steelmode. The average workman handles it on sight.

The principal vertical members are hollow posts consisting of 4 channels, with 45-deg. flanges, spot welded together. The horizontal members, of light angles spot welded to a web plate, are connected to the posts by knee-brace brackets. Additional structural rigidity is secured by horizontal corner brace plates and diagonal tie rods.

Wall and partition studs and floor joists may be of wood or steel, without change in shape of the steel frame members into which they fit, and are fastened through the holes provided. All studs have end-grain bearing against steel. There are no horizontal wood members in walls or bearing partitions. Where studs are omitted in openings, a steel lintel or girder provides strength and rigidity.

Steelmode framing preferably starts at the cellar footings and goes through to the roof plates. Lally column and I-beam construction is used for basement spans.

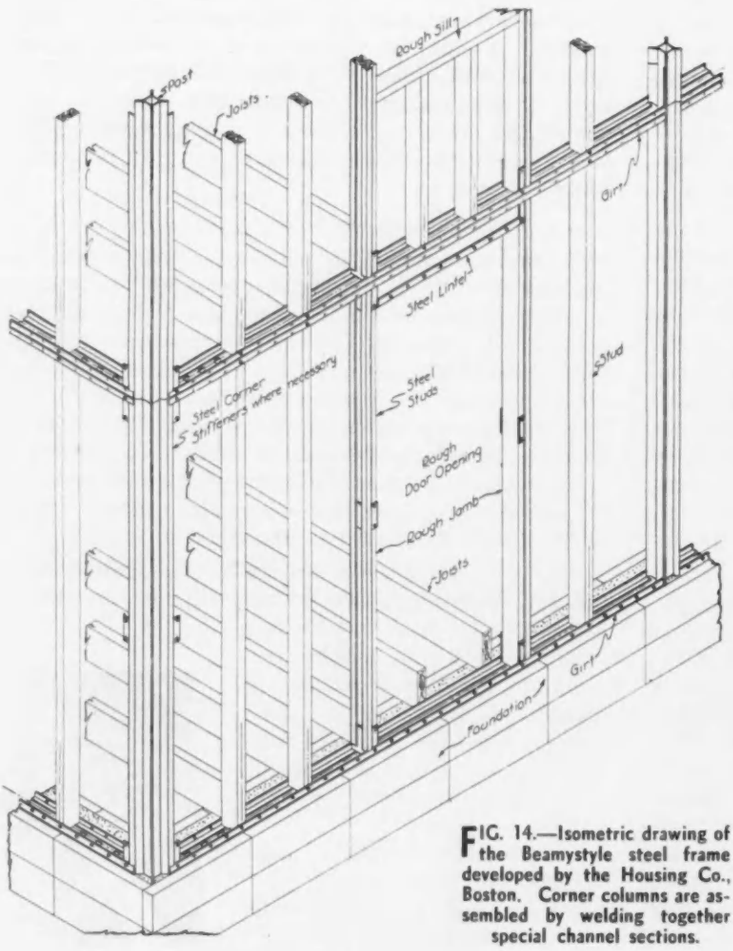

FIG. 14.—Isometric drawing of the Beamystyle steel frame developed by the Housing Co., Boston. Corner columns are assembled by welding together special channel sections.

Another system of steel framing is that designed by Burns MacIntosh, used by the California National Steel Co., Los Angeles. That company sends the following description of its method:

This steel framing consists of standard angle, channel or I-beam sections, used as studs, welded to base plate angles which are anchored to the foundation by bolts and tie plates. Furring girth angles are then welded to the inside and outside of the steel studs at proper intervals. A metal plaster base is attached to these furring girth angles, upon which is bonded the brick or stone veneer or stucco finish for the exterior.

The interior wall is treated as is usual in other constructions, using a metal plaster base.

An open truss joist is used for supporting both floor and roof loads. The

OF STEEL FOR HOUSES

FLOOR construction, or methods of floor support, is featured in this, the third section of an article dealing with use of steel in building houses. Several types of floors are described, together with methods of framing which have been developed by a number of builders. Rigidity and firesafeness are stressed in all of this construction work. And it must be so devised that the ordinary pocketbook can cover it.

upper chord of the steel joist is partially embedded in a reinforced concrete slab covering the entire surface of the floor or roof. Floor slabs may be finished with whatever facing is desired, and anything except wood shingles may be used for the roof.

This construction is so designed that any carpenter mechanic can erect a steel frame with the help of common labor and a mechanic able to weld steel electrically.

The Gabriel Steel Co., Detroit, has a distinctive steel frame made of channels fastened together with a welded bracing. Fig. 15 shows the detail of the wall studs, the steel base resting on the masonry wall of the basement, the methods of fastening the horizontal pieces with the uprights, the type of joists used, and the method of fastening the joists to the frame. A channel (A) is put through the joists, and welded, to brace them. This house is called the "Ideal Home." We quote from the pamphlet:

The sections which we have employed are standard rolled steel sections, built into small trussed members, in such a form as to permit the erection of the steel frame in about one-half of the time that would be required for its construction in wood. The form of the material also overcomes the usual difficulty which a comparatively thin wall construction presents, namely, transmission of heat and cold. The attachment of the interior plaster lath is made to one main member of the vertical studs, and the attachment of the insulating material on the

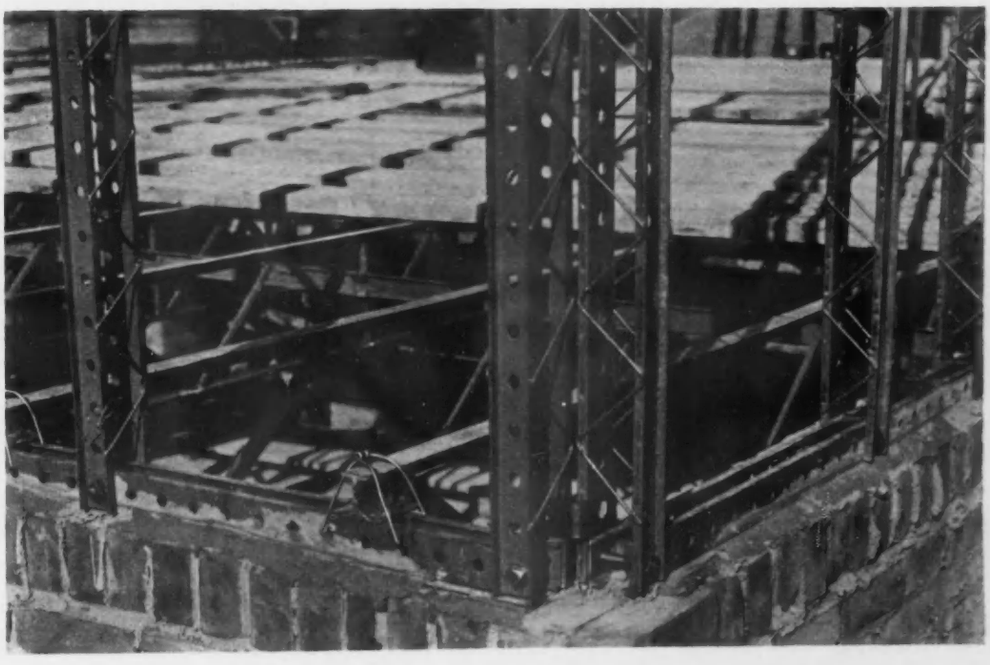

FIG. 15.—Detail of wall studs in the steel frame construction of the Gabriel Steel Co., Detroit. This shows clearly the method of attachment, the form of expanded truss for floor beams and the channel brace holding the floor beams against displacement.

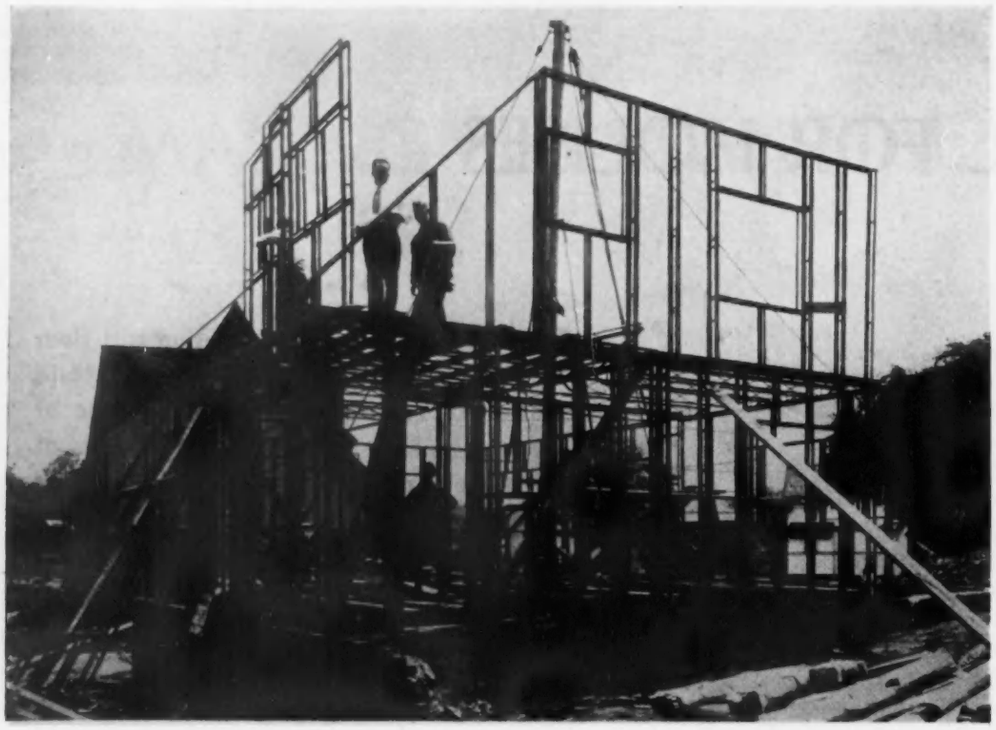

FIG. 16.—Erection of a steel-frame house in which assembly panels are welded together to form a large piece before being set in place. The Safety Welding Co., New York, claims considerable saving through doing this welding in the shop.

outside to the other member. Except at the corners of openings, no through-bolts for the attachment of any material are required.

Walls of this character possess an insulating value far superior to that of stud walls or steel structures using solid sections. The design of the individual member used creates a flexibility of construction comparable with that of wood. All vertical and horizontal members are multi-punched on 2-in. centers so as to permit attachment, one to the other, of any given spacing within the 2-in. multiple.

The Safety Welding Co., New York, has an all-steel frame with its sections welded to form a large piece before being set in place. This is shown by Fig. 16. No bracing is provided by the frame. The claim is that shop welding saves money on both fabrication and erection.

Bruhn Steel Products Co., Griffith, Ind., has built one-story residences using reinforced sheet steel interlocked for interior walls, ceilings and partitions. The rafters are steel.

The Universal Building Corpn., Sheboygan, Mich., furnishes the following description of its house:

A structural steel frame (see Fig. 17) is used with a 4-in. cast Haydite wall, with 1½-in. cork insulation and ½-in. plaster on the interior. The 4-in. H-columns in the wall are wrapped on the exterior flange with wired waterproof felt for 1-in. exterior stucco after wall panel slabs have cured and dried out. The stucco can be scored and colored to resemble stone.

The basement wall slab is 6 in. thick, slight-

FIG. 17.—Framework of a house built by Universal Building Corpn., Sheboygan, Mich. This is not only of steel frame but also uses steel forms for putting up the Haydite (concrete) wall.

ly reinforced between columns, and is corklined and plastered.

We will use steel guides for our forms instead of wood guides, as shown. Steel forms are 12 in. by 6 ft. Burned clay aggregate with sand and cement may be used instead of concrete for the floor and wall above grade. For the finished floors we will use a European method of imitation marble flooring colored to suit.

The "Simplex" type partition is used, with light steel pressed studs, rock lath and plaster.

In addition to the steel frame of a house, an idea for other uses of steel in a house may be had from the advertisement of Homes Permanesque of America, Inc., which lists,

Hi-rib lath	Enamel china steel walls
Paper-backed wire lath	Electric wiring conduits
Steel trim	Electric refrigerators
Corner beads	Steel garage doors
Radiators	Steel cabinets
Oil burner	Lighting fixtures
Radiator grille fronts	Fireplace
Steel and iron in boilers	Package receiver
Bathroom enamel ware	Incinerator
Hot-coil water heater	

This company, and also Steel Bilt Homes, Inc., takes the responsibility for building the entire house. This secures the best coordination of effort and should help to lower the costs. Permanesque describes its system as follows:

Permanesque homes are now being constructed throughout the country by reputable builders who are licensed and instructed in the construction after they have been approved with regard to their character, responsibility and financial integrity.

These homes are similar in construction, and incorporate every structural feature that tends toward a greater permanency and less depreciation and upkeep in the house. Exterior walls are brick, stucco or stone, backed with insulating units, and the floors are permanently rigid because of our steel joist and monolithic floors, which prevent sagging and cracking of walls. This construction is shown in Fig. 18.

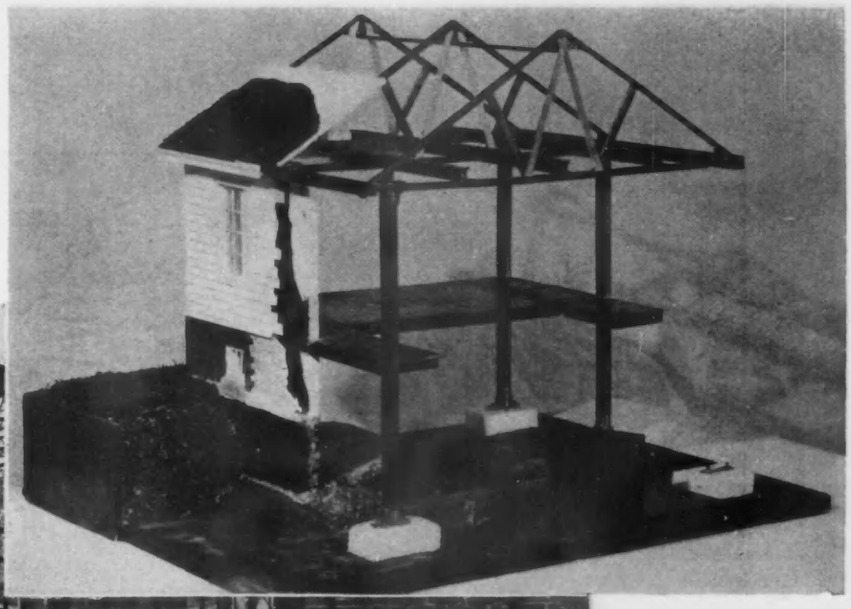

FIG. 18.—Floor construction of the Homes Permanesque of America. This features rolled forms for columns and girders and uses, as shown, expanded trusses for floor beams.

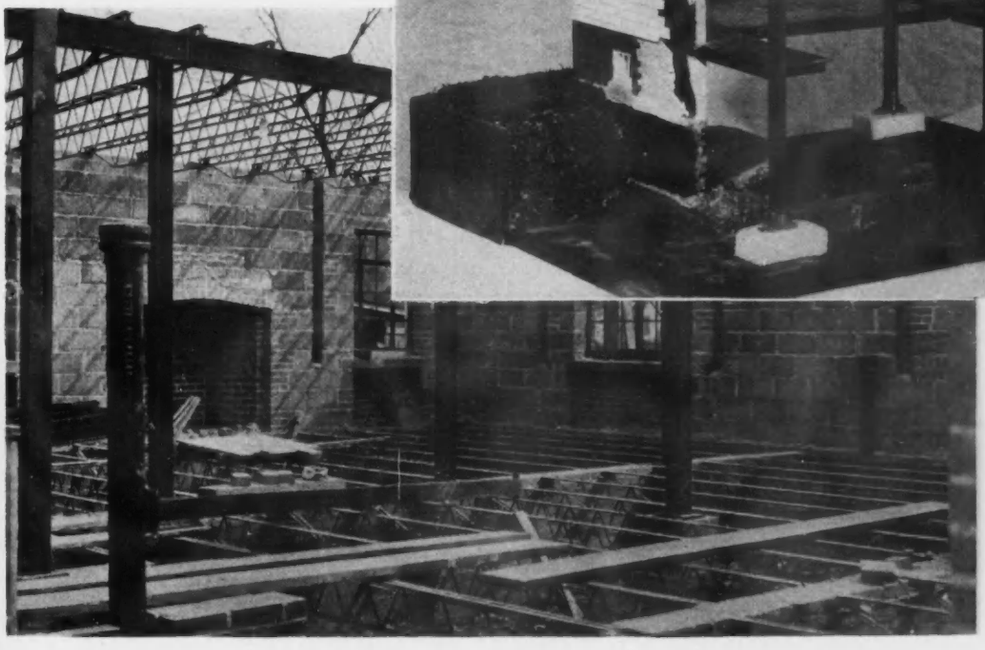

FIG. 19.—Steel construction developed by Harry Dovell, in which the use of battle-deck floors is extended into residences. Shop welding reduces costs, but calls for gin poles or caterpillar cranes for erection.

The construction is adaptable to every type of architecture, regardless of size. The home of the millionaire differs in no way structurally from that of the man of moderate means.

Our company maintains an architectural and engineering department and also a laboratory. No materials will be approved unless they have been thoroughly tested and fully measured up to our high requirements. The reason for this is, of course, to protect the home buyer, and prevent substitution of inferior materials.

Developed by Harry L. Dovell, of Chicago, the

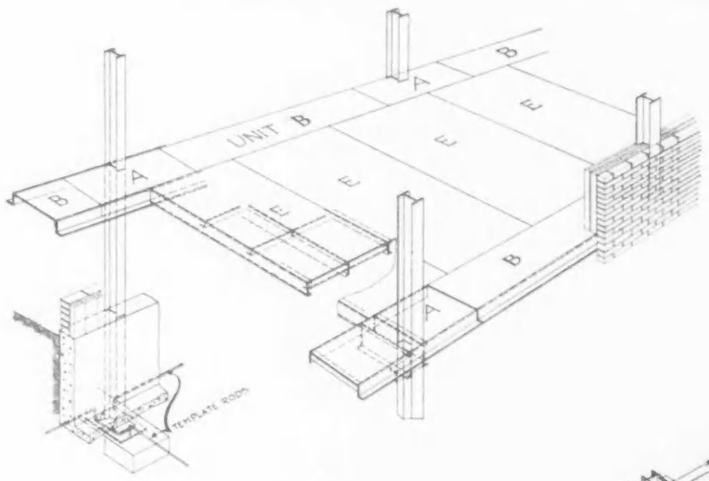

FIG. 20.—How the Dovell framework and battledeck floor plates fit together—an isometric rendering. The template rods (shown at lower left) are used to insure specified accurate spacing between columns, becoming then reinforcing bars in the floor and wall.

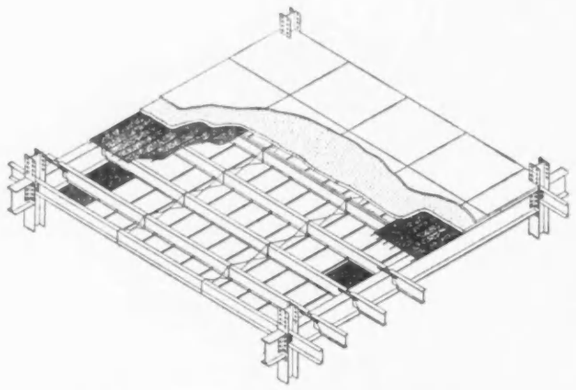

FIG. 21.—Floor construction of the Jones & Laughlin Steel Corpn., using Junior beams at a spacing of 30 to 36 in. The floor is reinforced concrete on metal lath.

Dovell steel frame for residences (Fig. 19) is made of rectangular steel units, built of standard structural shapes in the shop, and bolted together in the field, forming a complete steel supporting floor or platform carried on steel columns of H-shape. The floor is carried on an inside spandrel member supported on cantilevers fastened on the steel columns.

This leaves the outside wall free of large carrying members and allows the use of a small steel angle for supporting the wall material. This spandrel angle reduces the cutting and fitting of whatever wall materials are used, and the position of spandrel angle is such that a guide and lock are provided above and below the steel floor plate.

All spandrel walls and partitions are supported independently on each floor, and can be built in any order.

Inasmuch as our present wall materials are designed with the idea of carrying loads, we find them unsuitable for use with a frame which will support them. Hence research work is necessary to a final solution of the proper materials and their shape or form. One type of wall material used at present is shown in Fig. 20. This is a cast gypsum block, tongued and grooved as lumber, and extending from floor to floor in one piece.

Henry Dubin, architect, 14 Washington Street, Chicago, has designed and constructed a residence for himself in Ravinia, Ill. The main floor framing is mostly of 5-in. I-beams and 24-in. by 3/16-in. steel plates. The second floor is similar to the first, using the 24-in. plates with 3-in., 4-in. and 5-in. I-beams and channels. The roof is flat and constructed in a manner similar to the floors. There are only two columns in the building.

The floors were made in the shop in strips 48 in. wide and laid with 2-ft. gaps. The plates covering these gaps were welded in place in the field. The porches are of battledeck construction and were

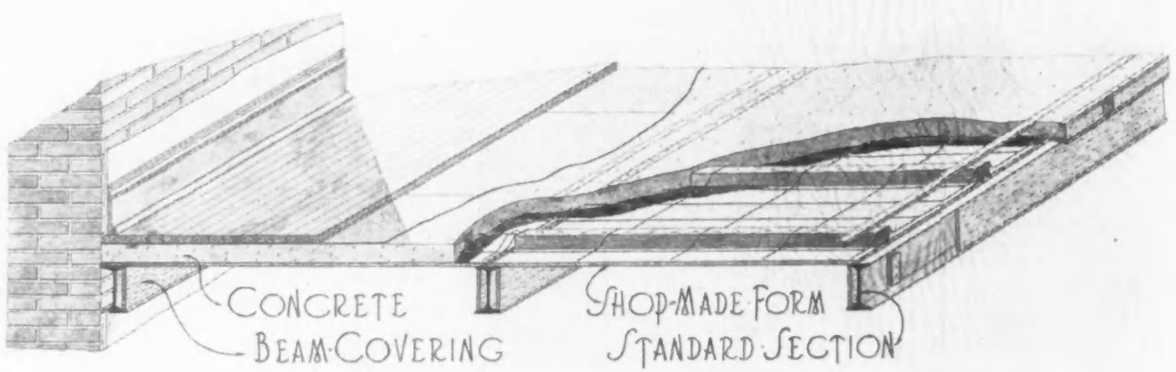

FIG. 22.—Thin, soundproof floor designed by National Bridge Works. A plasterboard form is used for the concrete, carried on standard beam sections, 4 ft. apart.

shipped complete from the shop. Steel stairways, a steel door to garage and steel frames and sash were used. The Inland Steel Co. assisted in making this work successful.

Use of steel for light floor loads has evolved three general types. The majority of builders use the open-web joist closely spaced, on which three types of forms may be placed to take the 2-in. concrete slab. One is a paper-backed lath stretched across the top of the beams, another is a high-rib metal lath placed the same way, and the third is the solid plate floor. Wherever concrete is used on a flexible form, care must be taken to keep all stresses off the floor until it is thoroughly set. In this type of floor a flat ceiling is necessary and there is considerable space between the finished floor and the finished ceiling underneath, which lengthens the stairs and heightens the house. A saving could be made by eliminating this waste space.

The Jones & Laughlin Steel Corporation uses a type of light floor shown in Fig. 21. The construction is simple and can be used with a flat ceiling under the beams or as a beam ceiling. The floor joists are placed farther apart (30 to 36 in.) than is possible when using flexible forms for the concrete.

A third type of floor has been used by National Bridge Works on several jobs. The form is shop-made with the reinforcing an integral part of the construction, as shown in Fig. 22. If this is used as a beam ceiling no plaster is necessary, since the bottom of the form makes a better surface than any plastering job can give. Beam coverings are easily attached to make any type of beam ceiling. Standard beams can be used on a span of 4 ft. with a floor thickness of only 3 in., to make a practically soundproof floor.

(To be continued)

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HANDLING FOUNDRY COSTS WITH PROMPT CORRECTION OF UNDULY HIGH ITEMS

A PLANT making 25 or 30 patterns of internal combustion engines for automobiles, motor boat and airplane use, together with heater units for residences, apartments and stores, has enough diversity of product so that calculation of the foundry costs becomes a matter of prime importance. A system of costs in use by the Lycoming Mfg. Co., Williamsport, Pa., gives such dependable results that any unexpected increase in the cost is detected almost at once and measures are taken to correct it.

Total cost of any casting, aside from overhead charges, is found by adding the following items: net metal cost, melting cost, molding cost, casting cost, cleaning cost, and welding cost, if any. These items, as applied to a given operation or piece, are split down on a basis of cents for each pound of good castings.

In working out these costs account is taken of the direct labor, indirect labor, miscellaneous supplies of all kinds and the labor expended upon them, and other forms of expense in the production of the casting.

Direct Knowledge of Profitable Lines

As these costs are worked out according to the type of casting, regardless of how large or how small the individual piece may be, it becomes easy to determine what castings are being made at a profit and which ones are causing the foundry a loss. Under these circumstances it is easy to arrange prices for the castings so that each will bear its own proportionate and proper amount of the expense, and leave no profitless operation on any type of product.

Departmental overhead is figured separately for each department. Melting costs are obtained by dividing the total charges against melting by the weight of all castings produced. Casting costs are obtained on the same basis.

For molding, tumbling, sand-blasting and trimming, the molding direct labor is divided into the indirect charges against molding, tumbling, sand-blasting and trimming, respectively, to obtain a percentage of overhead for these operations. Similarly the core department expense, including fuel, repairs and other miscellaneous items, is divided by the core room direct labor to obtain an overhead percentage for the core room. For the welding operations a similar routine is followed.

Departmental overheads consist of supplies and miscellaneous expense, repair expense—both labor and material—and other cognate items. Costs of the laboratory are charged against the melting department, including both salaries and laboratory supplies.

There is a monthly checkup on actual ascertained costs against the estimated costs. For this purpose the cost books are closed at the end of the day's work at the end of each month. In the following few days the costs are ascertained and comparison is made with the previous estimate. This is done not only in the gross figure, but for all the details of direct and indirect charges.

If any items show considerable excess over the estimate, a foremen's meeting is called, and the matter is threshed out in an effort to ascertain why the estimated cost was not met. All sorts of checks are made in the matter of details in endeavoring to place responsibility for excess costs, even though the over-all costs may have been entirely satisfactory.

It is largely the promptness with which these costs are analyzed which accounts for the essential success of the plan. No time is lost in getting at the facts and, as the figures are thoroughly reliable, it is a simple matter to put one's finger on where any trouble may lie and to initiate means to obviate it in future.

EXTENT OF DEPRESSION IN VARIOUS COUNTRIES

* * *

A STUDY of the operating rates in iron and steel and other fields, in a number of countries, has been made by *Iron and Coal Trades Review* (London). The table and diagram are taken from that publication.

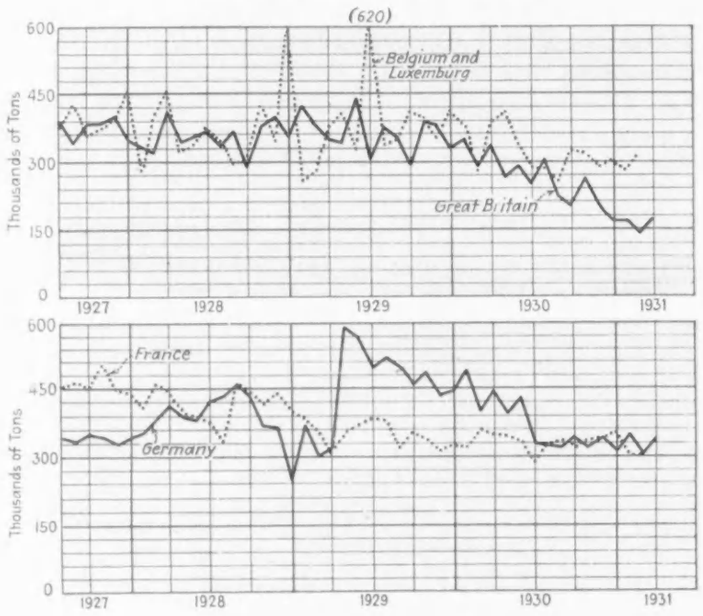
It will be noted that Great Britain and Germany have suffered more heavily, in curtailment of output in both pig iron and steel, than has the United States. In the cases of France, Belgium and Luxemburg, however, the depression has interfered less seriously with output than here.

DECLINE IN PRODUCTION

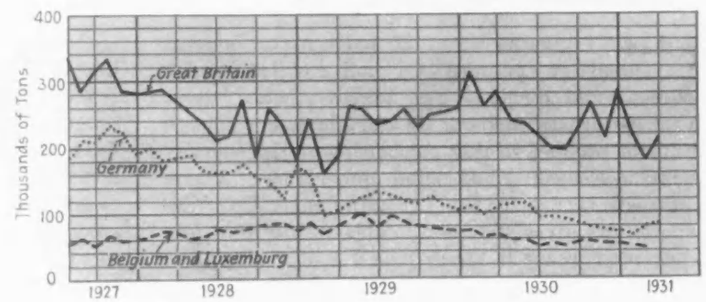
First Quarter, 1931 *vs.* 1930

Country	Pig Iron	Steel
Great Britain	47	42
Germany	45	36
France	11	10
Belgium	23	27
Luxemburg	27	23
United States	39	34

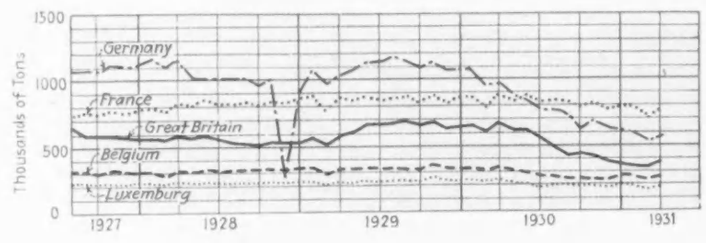
EXPORTS OF IRON AND STEEL



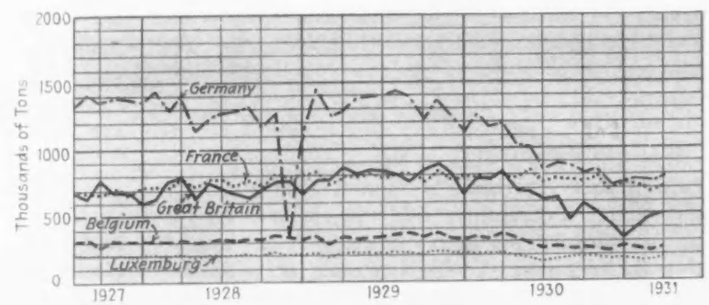
IMPORTS OF IRON AND STEEL



PIG IRON PRODUCTION



STEEL PRODUCTION



HEAT TREATING CHROMIUM PLATE INCREASES ITS CORROSION RESISTANCE

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HEAT treating chromium-plated copper panels to remove most of the hydrogen has resulted in a seven-fold improvement in the corrosion resistance of such material. Because the chromium-plated parts of automobiles did not stand up under conditions in certain Western sections of the country where calcium chloride is used to surface roadways, the General Motors Corpn., Detroit, instituted investigations to overcome this disadvantage. The results were given in a paper, "Heat Treatment of Chromium Deposits to Increase Their Resistance to Corrosion," by R. J. Wirshing of the corporation's research laboratory before a meeting of the Electrochemical Society. Certain portions of the paper follow:

While investigating the action of calcium chloride solutions on chromium deposits, we were faced with the fact that in a few isolated cases the deposits were only moderately affected by the calcium chloride, although in all other cases the chromium was badly attacked. While it was not known under what conditions these more durable plates had been made, they at least offered encouragement by indicating that the problem could be solved.

A series of tests was then undertaken in which chromium was plated on copper panels, covering the entire range of possible current density and temperature, but keeping within the "bright range" so as to cover commercial practice. These panels were then subjected to the calcium chloride spray test. This test is made in an ordinary spray cabinet, using a 20 per cent calcium chloride solution, spraying the pieces under test for 8 hr. and then allowing them to stand outside of the cabinet, without washing, for 16 hr. This constitutes one cycle.

It was noticed that the panels plated at low current densities and the highest temperatures possible for those current densities, and those plated at high temperatures with the lowest possible current densities for those temperatures, gave the best results so far as resistance to calcium chloride was concerned.

Hydrogen Alloys with the Metal

A study of these results indicated that hydrogen might be playing an important part in the character of the deposit. It is a well known fact that in the electrodeposition of metals hydrogen is usually evolved, and some of the hydrogen forms an alloy with the metal. An increase in the current density increases the content of hydrogen in the alloy, and an increase in the temperature of the plating bath tends to decrease the content of hydrogen. It is also stated in the literature that metals alloyed with hydrogen are more soluble than the pure metals themselves.

All of these facts fit in with the results obtained in our tests. It seemed then that, by a proper combination of temperature and current density, a chromium deposit could be produced that would be much more resistant to the solvent action of the calcium chloride solution. However, when plating in the "bright range" any decided rise in temperature must be accompanied by a rise in the current density, while a drop in the current density must carry with it a drop in the temperature. This made it impossible to gain full advantage of a rise in temperature or a drop in current density, since the two factors have to be controlled in such a way that they act against each other.

It was therefore necessary for us to find some means of removing the hydrogen that was alloyed with the chromium, after the piece had been removed from the plating bath. Previous work had indicated that heat might be employed to accomplish this result. Accordingly, more test pieces were prepared and some of them were subjected to heat. Both the temperature of the oven and the length of time of heating were varied.

Suitable Heat-Treating Temperatures

Both the heated and unheated test specimens were then subjected to the calcium chloride salt spray and in every case the heated panels were better than the blanks. Further experiments showed that deposits that had been heated for 30 min. at 450 deg. F. (232 deg. C.) would stand seven cycles in the spray without sign of failure, while unheated specimens usually failed in one cycle. Two hundred degrees F. (93 deg. C.) for 30 min. seemed to be the lower limit at which any improvement was to be gained, while any less period than 20 min. at 450 deg. F. (232 deg. C.) would not give the greatest durability.

It was then thought that hydrogen present in the base metal upon which the chromium was plated might play a part in the results obtained. However, heating the panels before plating and not after, failed to produce any improvement in the resistance of the chromium to the calcium chloride solution. Heating both before and after plating was no better than heating only after plating.

Chromium deposited directly on metals other than copper, such as brass, stainless steel and rustless iron, can also be heat treated in this way, with a

(Concluded on page 522)

LUBRICATING 881 BEARINGS FROM

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A FORCED-FEED lubricating system, largely automatic, has been provided for lubricating all the bearings of a 10-in. merchant bar mill and auxiliary equipment recently erected at an Ohio steel plant. A total of 881 bearings exclusive of those on the roll necks of the mill, all of the anti-friction type, are lubricated by the system. A separate mechanical system has been installed for lubricating the roll necks of the mill stands.

The double cooling bed, 333 ft. long, with its two runout tables and two shear approach and shear runout tables at the lower end of the bed, are lubricated by two duplicate systems. These supply lubricant to 788 bearings. This is said to be the largest automatic lubricating system ever installed. There are 580 bearings for the cooling bed, side or runout tables, shuffle-bar lift drive, lift beams and the shuffle-bar drive and 208 for the shear tables.

Lubricant is circulated by two Trabon-type motor-driven pumps located in the basement and each connected to a 2-in. steel header, also beneath the mill room floor. The pumps deliver grease through the lines at 5000-lb. pressure. The two headers extend a short distance between the cooling bed and one runout table, and across to the opposite side of the bed; one has a branch that extends beyond the cooling bed, to supply the shear tables. The two pumps are connected by an interlocking line so that one pump may supply the entire system, should the other be out of commission.

System Split into a Dozen Circuits

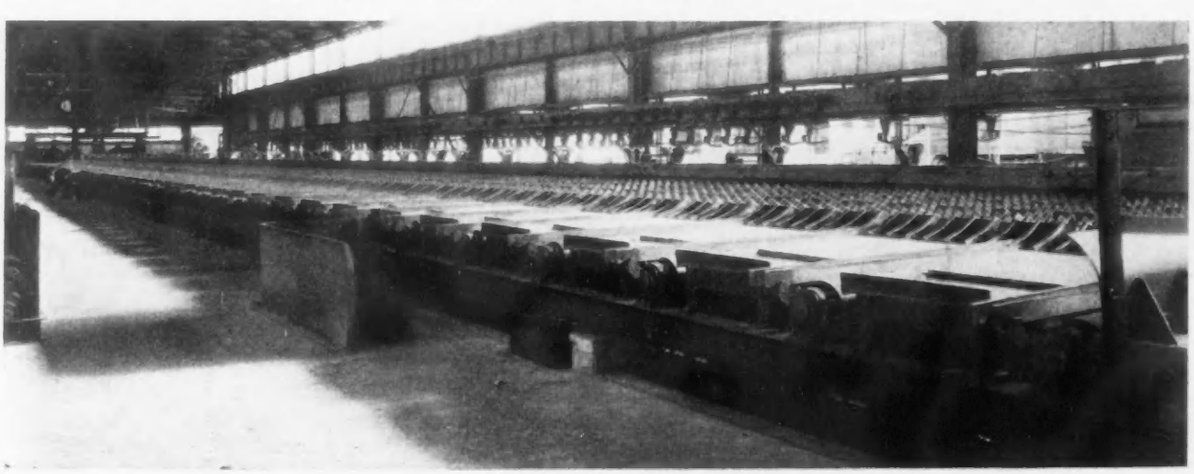
Thirteen circuits of ½-in. supply lines leading from the headers extend across the tables and under the cooling bed and shear tables, these supply lines being in close proximity to all bearings. Each circuit supplies from 37 to 62 bearings.

At the point of connection between the header and circuit line is a globe-type valve. These are open only when the bearing is being lubricated. When they are shut off there is no pressure on the system. There are six of these valves, with two of the circuits on each valve, except that one valve is connected with three circuits. Another valve, for reversing the flow of lubricant through the circuit, is placed back of each globe valve and reverses each circuit.

Lubrication is supplied to each bearing through a Trabon-type feeder in the supply line. The principal parts of this include a main floating piston in a chamber the size of which determines the amount of lubricant to be shot to the bearing each time, two dumbbell pistons and various ports.

By the movement of the main piston to the end of the cylinder the lubricant is forced out of the

ONE side of the hot bed, showing lines that deliver lubricant to the bearings for the rollers on the runout tables, lubricated by the Trabon motor-driven lubricating system. ▲ ▲ ▲



A CENTRAL PUMPING PLANT

NEARLY 900 bearings are systematically lubricated in the system here described, at a predetermined pressure and with a stipulated quantity of grease. Lubricant is circulated by two pumps, the direction of flow through the system being reversed after each "shot." In a few cases hand pumps are used at local points. For the most part, however, the system is fully automatic.

MOTOR-OPERATED grease pump to supply lubricant at 5000 lb. pressure to the distributing lines.

cylinder and on through a feeder line to the bearing. When the piston is in the extreme position, ports opening into the cylinder are uncovered and the lubricant passes from the main line through the cylinder, back to the line and on to the next feeder. For the next shot of lubricant—sent through the line in the opposite direction—the operation of the feeder is reversed. The feeders are made in various sizes, with a capacity of 0.05 to 0.8 cu. in. Contact between feeder and bearing is through a flexible hose and section of steel pipe, the former to prevent vibration from reaching the feeder.

Sequence of Movements in Operation

When the bearings are to be lubricated, the operator starts the pump, opens a globe valve and sets the circuit reversal handle at the correct position. The grease then flows through the circuit and lubricates each bearing. When the flow of lubricant has completed its circuit back to the circuit-reversing valve, this is shown by an indicator operated by a plunger on the circuit reversal valve.

This indicator also gives immediate warning to the operator should the system not be functioning properly. In case there is an empty grease tank or a break in the line, so that the lubricant does not complete the circuit, the indicator does not register. Should a line become stopped up, so that the lubricant does not complete its circuit and pressure builds up in the line, the pump automatically stops, which indicates that there is something wrong in the circuit.

When all circuits are lubricated the pump is shut off, relieving pressure on the header lines. By means of the reversing valve the flow of lubricant through the circuit is always reversed for the succeeding lubrication. Should the lubricant be sent through the line twice in the same direction, it would pass directly through the feeders and back to the main line, none being forced into the bearings.

The pumping unit includes a 320-lb. container which is filled from a portable floor tank, from which it is pumped into the container with a hand pump. A medium-weight lubricant is used.

The system is flexible in that it may be extended by lengthening the headers and adding additional circuits. An extension to the branch header serving the shear runout tables is contemplated.

Lubricating Some Equipment Locally

Four individual systems equipped with hand pumps are provided. These all have feeders similar to the power-driven system and also have hand reversing mechanism. Two of these units lubricate 11 bearings on each vertical shear at the end of the cooling bed. The pump, with an 8-lb. grease container, is mounted at the side of the shear. A third

hand-operated unit lubricates 45 table roller bearings on a table 106 ft. long that delivers cold billets to a reheating furnace. The fourth hand-operated system lubricates 26 bearings. Six of these are on a set of pinch rolls at the discharge side of the furnace, four are on an adjoining hot shear and 12 on a shear runout and mill approach table.

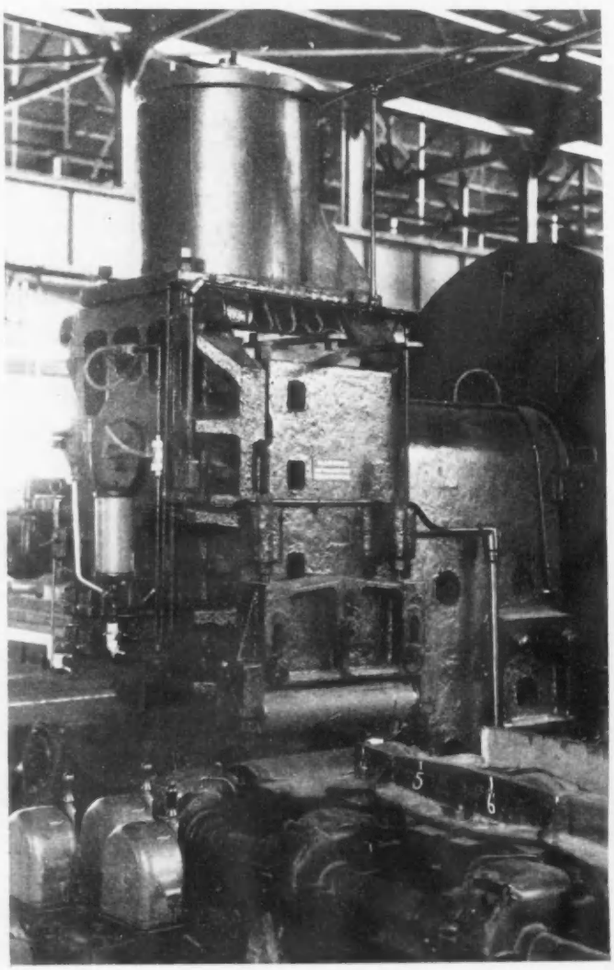
This system is arranged in three circuits, one for the pinch rolls, one for the hot shear and the third for the table. The pumps of the two last-mentioned units are provided with 12-lb. grease containers. These units are not connected with the main lubricating system, because they are quite a distance away and because the bearings they serve require more lubrication than those on the hot bed and its auxiliary table equipment.

Roll-neck bearings of the bar mill are lubricated by a mechanical system with a simple positive drive that assures a constant delivery of the grease to the points to be lubricated. This mill, consisting of three stands, is lubricated by a Trabon system designed for handling the very heavy lubricant required for that purpose.

Grease is placed in a tank, connected to the bottom of which is an air cylinder with which a constant pressure is maintained. The air pressure is 40 lb. per sq. in. and the grease is delivered from the tank at a pressure of 100 lb. per sq. in. From the tank the grease is forced into a series of piston chambers arranged in three blocks, four cylinders to each block. As the pistons move upward a valve port is opened in the piston chamber and the air pressure forces the lubricant through the valve into the piston chamber. After the piston reaches its top position and starts downward the valve closes, and the piston forces the grease through 1-in. supply lines that feed the roll-neck bearings.

The up-and-down movement of the pistons is effected by two side rods on each unit, actuated by cams on a main shaft driven slowly by a motor through a gear-reduction set. The speed of this shaft may be varied from one revolution in 2 min. to two in 1 min., to regulate the amount of grease to be supplied for the bearings. There is an individual line for lubricating each of the four roll-neck bearings at the top and bottom on each mill stand. One block takes care of the four lubricating points on a mill. A pressure of 700 lb. per sq. in. is required to force the lubricant through the 125-ft. supply lines.

Gages are provided on each line. The pistons alternate in their up-and-down movement and the operator, by watching the gages through a cycle of operations, can tell if there is trouble in any line. The system is flexible in that more piston blocks may



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VERTICAL shears at the end of the hot bed are equipped with a greasing system consisting of a Trabon hand-operated pump and feeders.

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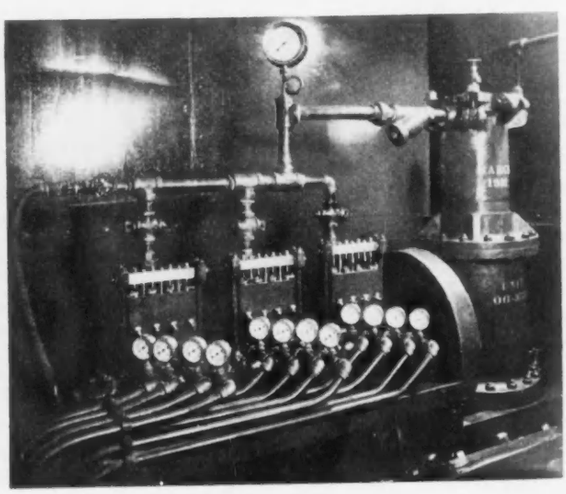
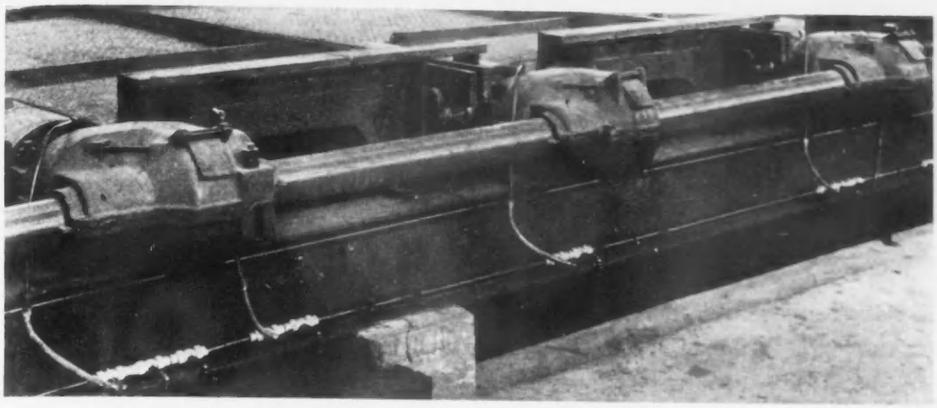
FORCE-FEED lubricating equipment delivering heavy lubricant to the roll-neck bearings.

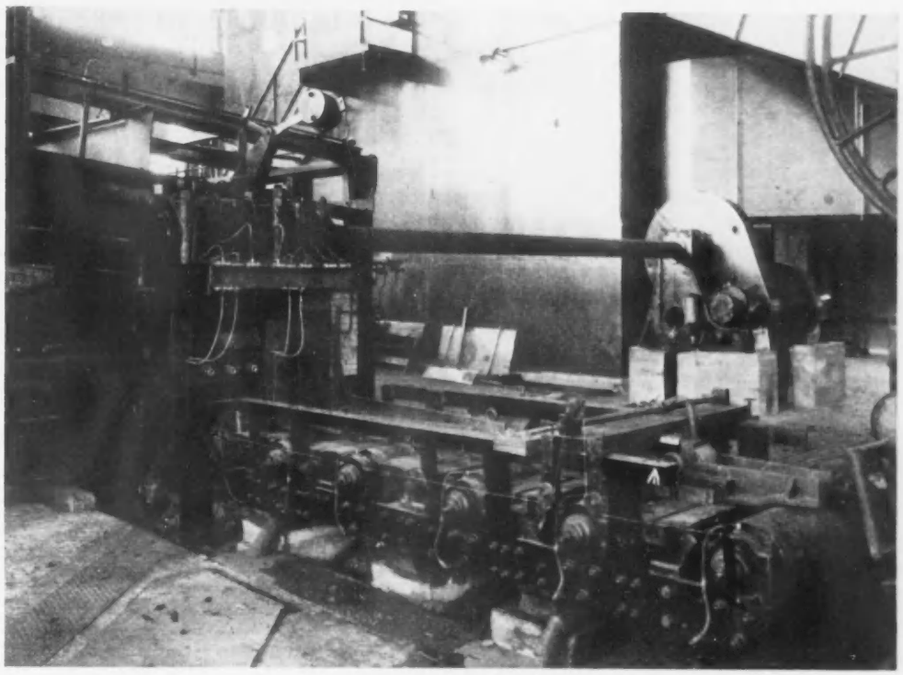




CLOSE-UP view of a section of one of the tables, showing the method of lubricating the bearings for the rollers. Each table roll bearing is fed through a steel feeder. Connection is made with a hose to avoid vibration.

* * *

HOT shear and table that delivers the bar from the shear to the first mill stand, equipped with a hand-operated lubricating system.



be added to supply additional mills. The lubricating equipment is located on the mill floor and requires little floor space.

These mechanical lubricating systems for the entire mill were built and installed by the Trabon Lubricating Equipment Co., Detroit.

Ingot Size May Influence the Quality of Products

CERTAIN conclusions have been drawn by A. Portevin, E. Pretet and H. Jolivet (*Revue de Metallurgie*, March, 1931) concerning the influence of ingot section on the quality of forged and rolled products. Whether rolled from a 4-ton ingot 16 in. square or from a 1-ton ingot 8 in. square, bars of electric furnace chrome-nickel steel of a given section less than 2½ in. square showed no important differences either in longitudinal or in transverse tests.

It is commonly advisable and often necessary to keep reduction at a minimum for certain special steels for automobiles and aviation, but, even so, a certain degree of deformation is desirable to ameliorate the effects of dendritic crystallization. The minimum amount of reduction desirable is equally dependent on the macrostructure and on the dendritic segregation. In sound steel there is no drawback, so far as transverse ductility is concerned, to large reductions. Dangerously weak values seem to be caused by segregated impurities which may cause trouble in any case, and, if the extent of reduction is small, this effect is added to that of the partially deformed primary crystallization.

In predicting the properties of the products it is necessary to consider not only the degree of reduction but also the effect of each step in order, as well as the original structure of the ingot. For products of given specifications it is convenient to bear these factors in mind when choosing the ingot section. When the ingot size is necessarily fixed by other factors, the character of the product may be influenced in the desired direction by controlling the cooling rate or, with more difficulty, the working down to the product.

RATE AND LIMITS OF STRAIN-

LIMITS to which strain-hardening (as occurs in forming sheets) may be carried safely are outlined in this, the second installment of four articles by the author, dealing with plastic metals. It is essential that cold-working should not go beyond the limit of plasticity; otherwise fracture would result. Cold-working, however, of course increases the elastic limit and also the yield point—the vital element in plastic working.

WITH somewhat further development of technique and accumulation of data, the strain-hardening curves for a number of metals would be likely to take about the forms shown in Fig. 8. These curves are designed to give a theoretical yield point for the material in any state of strain-hardness, and the change in yield point which will accompany any further amount of cold-working. Each curve is limited to properties and to work performed at room temperature (say 60 to 80 deg. F.), and to a given metal, such as commercially pure aluminum, electrolytic copper, 0.10 per cent carbon steel, etc. The extent of each curve should indicate the upper and lower limits of the plastic range for the particular metal.

THE LOWER LIMIT of the curves should represent either normal or best commercial practice in annealing the metal. Obviously, this cannot be a precisely fixed point, as annealing practice varies widely. In fact, that is the reason that each strain-hardening curve is extended from a theoretical zero at the origin, as suggested by the dotted line in Fig. 9. Possibly zero is a proper value for the yield point of metal annealed to the ultimate perfection of the single crystal. Zay Jeffries has commented that unexpectedly small loads will deform single crystals. ("On the Plasticity of Metals," in *Mechanical Engineering*, April, 1931.)

Fig. 9 shows unit strengths for copper of 30,000 to 60,000 lb. to the square inch, yet, according to Mr. Jeffries, "a single crystal of copper ¾ in. in diameter and long enough to grip can be bent without difficulty in the two hands." And for a single crystal of magnesium wire "the elastic limit is so low as to be hardly measurable." At the temperature of liquid air, 190

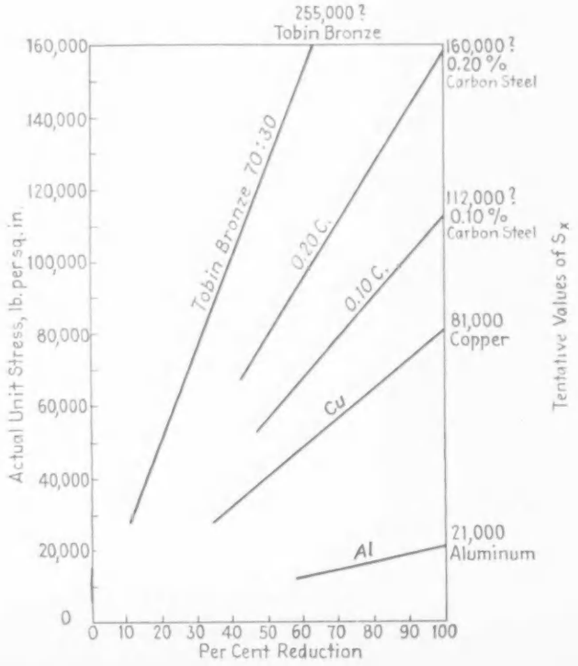
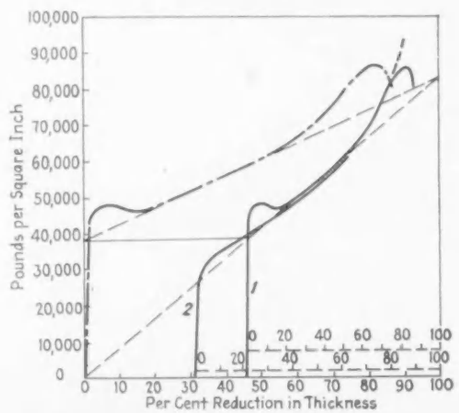


FIG. 8.—(at left) Purely tentative curves showing commercial cold-working range and rate of strain-hardening at room temperature for several metals.

FIG. 9.—Strain-hardening curve from unrelated samples of copper, showing effects of using up all slip planes and of internal fractures.



HARDENING OF PLASTIC METALS

By E. V. CRANE
Staff engineer, E. W. Bliss Co., Brooklyn

deg. below zero F., "it remains so soft that it could be bent with scarcely any effort."

Rarely is a single crystal in a piece of metal of any size realized. In commercial annealing a limited crystal size is usually desirable, as the growth of extremely large crystals is likely to take place in limited areas, under conditions of favorable strain. As a result, these local areas would be relatively softer and weaker than the remainder of the article.

THE UPPER LIMIT of the strain-hardening curves has been ably described by R. L. Templin, in a paper, "Effects of Cold-Working on Physical Properties of Metals," read before the American Institute of Mining and Metallurgical Engineers in 1929. An illustration of the phenomena which he mentions occurs at the upper end of Curve 1 in Fig. 9. He says:

"When there is a marked increase in the rate of strain-hardening the explanation appears to be that most of the available crystal slip planes have been utilized, and there is a preferred orientation of grains throughout the material, with the result that further working tends to make the metal brittle, but at the same time causes a marked increase in tensile strength. If, beyond the transition point, there occurs a marked decrease in the rate of strain-hardening, we usually find that the material has begun to fail by internal shear, resulting not only in brittleness but also in decrease in tensile strength."

Curve 1 in Fig. 9 was arranged from a cold compression test of slugs of electrolytic copper rod, as received. The original test curve was plotted from over 100 readings. The final slug showed marked tensile fractures around its periphery.

If curve 1 had represented a tensile test, failure would have occurred in the early part of the transition, where all available slip planes had been used up and internal fractures were starting. Thus the "Upper limit" of strain-hardening curves is approximately identical with the "actual ultimate tensile" expressed as a true *unit stress*.

THE INITIAL YIELD POINT obtained in any test may show considerable eccentricity, as in Curve 1, Fig. 9. Here the sharp rise above the rate of strain-hardening curve is attributed to the fact that the test was compressive in nature, and was being performed upon material which had previously been cold-worked in tension.

Thus it might be expected that the original material would contain many layers of atoms slightly

(*Continued on page* 543)

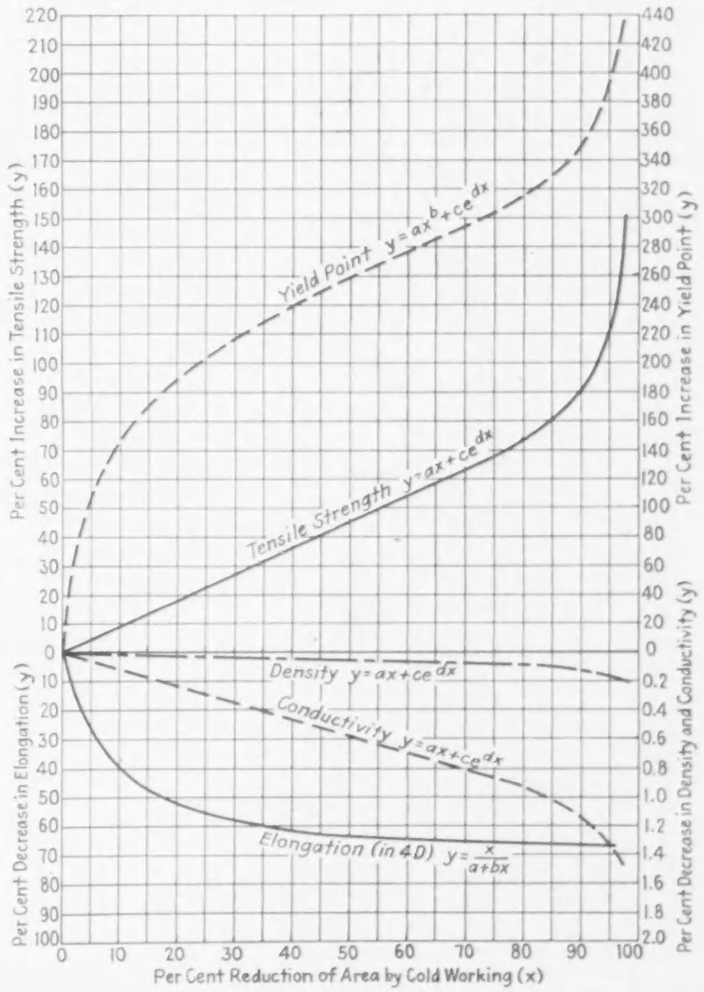

Yield Point $y=ax^b+ce^{dx}$
Tensile Strength $y=ax+ce^{dx}$
Density $y=ax+ce^{dx}$
Conductivity $y=ax+ce^{dx}$
Elongation (in 4D) $y=\frac{x}{a+bx}$
Per Cent Increase in Tensile Strength (y)
Per Cent Increase in Yield Point (y)
Per Cent Decrease in Elongation (y)
Per Cent Decrease in Density and Conductivity (y)
Per Cent Reduction of Area by Cold Working (x)

FIG. 10.—Effects of cold-working upon the physical properties of aluminum.

Cast Iron Roof of Great Strength and Light Weight Developed for Industrial Plants

A NEW product developed by the engineers of the United States Pipe & Foundry Co., Burlington, N. J., may now be obtained for roof construction and replacement. This product is the new "Usicast" roof, designed for industrial structures. The idea of using cast iron for a roofing material is by no means new. The dome of the national Capitol in Washington is composed entirely of cast iron.

This dome, completed in 1870, has withstood the ravages of time for over 60 years without structural replacement or repair, a fitting tribute to the permanance of cast iron. The Usicast roof differs from the roof of the Capitol dome only in that improvements have been made in design, rendering the application more simple. The permanence of the material has not been altered.

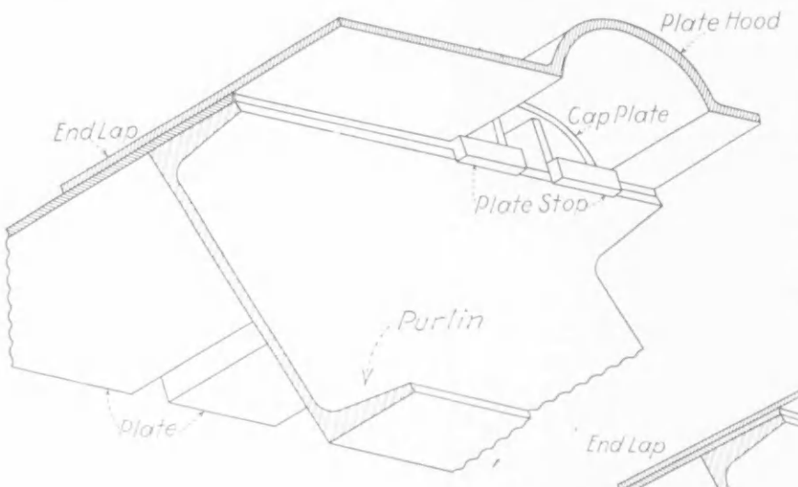
Usicast roof consists of cast iron plates laid on the roof purlins and joined together by cast iron cap plates, which in turn are fastened to the roof purlins by keyed lugs of ingenious design. This renders the whole roof an interlocked system, integral in itself and integral with the roof trusses to which the purlins are fastened. The Usicast roof is said to be windproof, rainproof and proof against destruction from building vibrations caused by cranes, trucks and heavy machinery. The play between the various parts is sufficient to permit temperature expansion and contraction without setting up leaks. And all this is accomplished without the use of plastic joint compounds, though such may be used if desired.

In a roof of any kind, the three desirable points are high strength, light weight and freedom from leaks. The strength of this roof is great. Each plate on the assembled roof will carry a uniformly distributed load of 400 lb. to the square foot, over a purlin spacing of 4 ft. The weight is also favorable for use on industrial work, amounting to 10.8 lb. to the square foot of assembled roof. Resistance of the material to atmospheric corrosion, as well as to corrosion caused by acid and alkali fumes, is scientifically established.

Costs on this roof are said to be low. When the long life of the product is considered, together with the minimum maintenance and the inherent value of the material as marketable scrap, the low ultimate cost can be readily appreciated, it is stated.

Assembly is accomplished by laying along the eaves the required number of plates to make up one course. The plates are prevented from slipping by a lug cast on the under surface of each plate, which rests against the roof purlins. A gap of about one inch is left between plates laid side by side. The cap plates are then placed over these joints and the keying lugs pass through the gaps between the plates. As soon as the cap plates are located, they are fastened to the purlins by means of a key, as shown in the drawings.

Another course of plates is then laid, with the joints staggered against the first course, and the cap plates are set in place, and so on. Special ridge plates and cap plates are furnished for the ridge. It is interesting to note that all of the assembly is accomplished from the outside, except for the keying of the last ridge



STANDARD and cap plate end lap and plate stop, showing (between stops) the gap left between plates.

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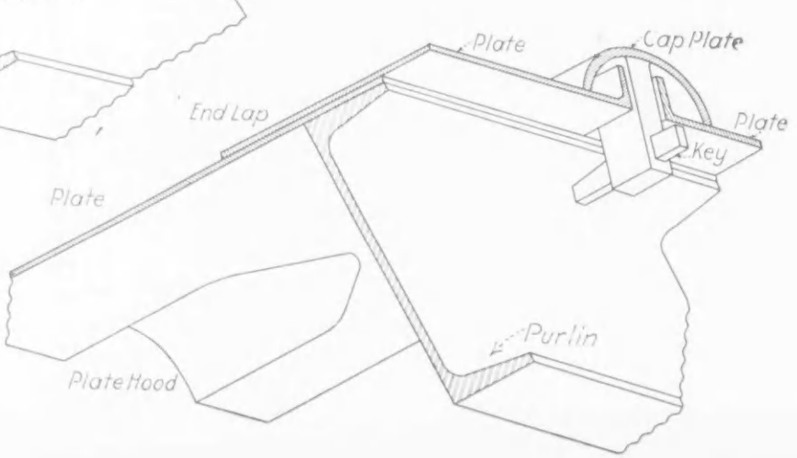

STANDARD and cap plates locked to purlin by means of tapered key.

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GENERAL arrangement (isometric) of a cast iron Usicast roof, showing relations of cap plates and ridge plates to the roofing plates themselves.

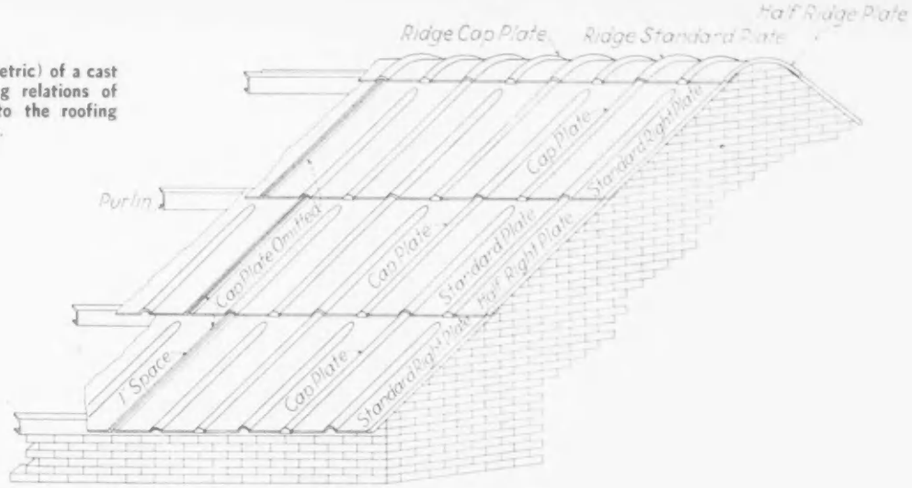


plate. This minimizes the use of staging and scaffolds.

Standard Usicast roof plates and cap plates can be obtained from stock, as well as the half-plates necessary to complete the rows of standard width. For roofs whose width is not such as to require an integral number of standard plates, odd sizes to suit may be obtained. The same is true for roofs requiring dormers, hips and valleys. A booklet fully describing the Usicast roof is now available for distribution.

Savings in Roll Grinding

THE performance of a roll-grinding machine was recently investigated by the A. C. Nielsen Co., Chicago. The machine was built by the Farrel-Birmingham Co., Inc., Ansonia, Conn., and had been installed in the Brackenridge mills of the Allegheny Steel Co. to dress rolls for the manufacture of highly finished sheets used in fabricating automobile bodies and metal furniture. The results of the study are made available with the approval of W. F. Detwiler, vice-president and general manager of the Allegheny company.

The grinder was put into use in January, 1924. The average number of rolls ground a day is 8, or 3 hr. to the dressing. The cost of roll dressed is shown to be $5.52, including fixed charges, power and labor, which amounts to a saving of $1.86 per roll, as against the experience when using a roll lathe. This accordingly makes a daily saving of $14.88 (8 rolls a day, 3 hr. each roll), or for a year of 300 days of $4,464. Besides this, on the score of 37 chilled rolls used up in 1930, the Nielsen engineers calculate that, because of the minimum amount of material removed in each dressing, seven more of the rolls would have been required were a roll grinder not used, or a saving on the basis of $700 a roll of $4,900. Thus a combined saving is figured of $9,364, a sum representing a return of 42.6 per cent on the investment in the roll grinder.

The accompanying tables show the handling and effective working time of the grinding machine when dressing different sizes and types of roll and also the history, so to speak, of the 37 chilled iron rolls which gave up their life in 1930.

Roll Grinding: Farrel-Birmingham Single Wheel Roll Grinder No. 6248 (32-In.) with 30 x 3-In. Carborundum Wheels and Overhead Traveling Crane to Handle Rolls

Roll	Roll I.	Roll II.	Roll III.	Roll IV.	Roll V.	Roll VI.
Material	Forged Steel.	Alloy Steel.	Chilled Iron.	Chilled Iron.	Chilled Iron.	Chilled Iron.
Purpose	Four-High Mill.	Roughing Mill.	Hot Mill.	Hot Mill.	Hot Mill.	Hot Mill.
Diameter, in.	12	28	30	30	30	30
Length of face, in.	50	60	52	48	44	36
Wheels and Speeds:						
Wheel diameter when used, in.	30	23	23	23	23	23
R.p.m. of grinding wheel	600	785	785	785	785	785
Traverse in ft. per min.	0.362	1.93	0.35	0.35	0.35	0.36
Roughing speed, ft.	...	...	2.0	2.0	2.0	2.0
Grinding Time:						
Set up time, min.	6	10	12	10	12	6
Grinding time, min.	300	150	255	220	200	180
Removal, min.	5	5	5	5	5	5
Total floor-to-floor time, hr.	5.18	2.75	4.53	3.92	3.62	3.18
Reduction in roll diameter, in.	0.0075	0.0938	0.0313	0.0313	0.0313	0.0313

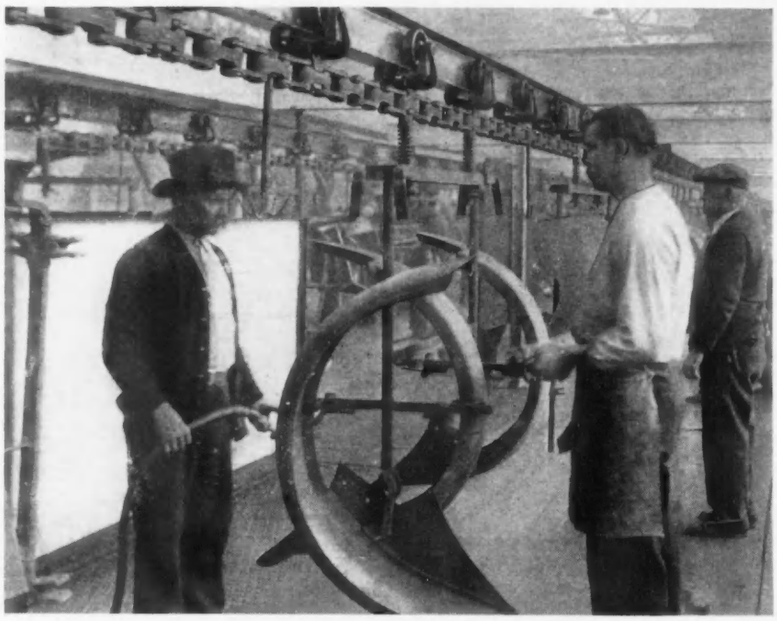
Dressings of 37 Chilled Iron Rolls Used Up in 1930

Size of Roll, In.	No. of Rolls	No. of Dressings		Reduction in Roll Diameter, In.		
		Total	Per Roll	Total	Per Roll	Per Dressing
30 x 36	2	40	20	1.688	0.844	0.0422
30 x 40	7	182	26	7.000	1.000	.0385
30 x 44	8	154	19	7.313	.914	.0475
30 x 48	1	24	24	1.000	1.000	.0417
30 x 52	4	72	18	3.125	.781	.0434
30 x 56	4	79	20	3.563	.891	.0451
30 x 60	8	167	21	6.313	.789	.0378
30 x 66	1	20	20	.625	.625	.0313
30 x 76	2	30	15	1.375	.688	.0458
	37	768	20.8	32.002	.865	.0417

Shipments of enameled sheet-metal ware in June, as reported by 15 manufacturers, representing approximately 80 per cent of the industry, were valued at $807,676, compared with $967,415 in May, 1931, and $996,270 in June, 1930, according to report of the Bureau of the Census. The six-month total for 1931 amounted to $5,980,780, compared with $7,005,844 for first half, 1930. The enameled ware included in the summary consists of utensils having a vitreous coat on a sheet steel or iron base, and does not include equipment such as stoves, heaters, signs, etc.

Interstate Equipment Corpn., Elizabeth, N. J., has consolidated the B & B Aerial and Automatic Aerial tramway systems, which are now handled by the company's tramway department, with engineering office at 25 Church Street, New York.

Prepares Sheets for Enameling by Bonderizing



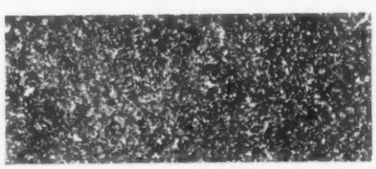
Inspecting fenders after they have passed through the process.

TO prevent damage caused by rust following the scratching of the surface or marring of the finish, and to insure adherence of the enamel for the life of the car, sheet metal parts going into model A are being treated with Bonderite by the Ford Motor Co. Fenders, steel spoke wheels, running board shields, lamp tie rods, rear light brackets and front splash pans are among the parts receiving this treatment.

For this purpose the Ford company has set up in the north end of its pressed steel division building at the Rouge plant the largest Bonderizing installation in the world. It holds more than 143,000 gal. of the solution and is traversed by a conveyor 1845 ft. long, which carries parts through the processing operation.

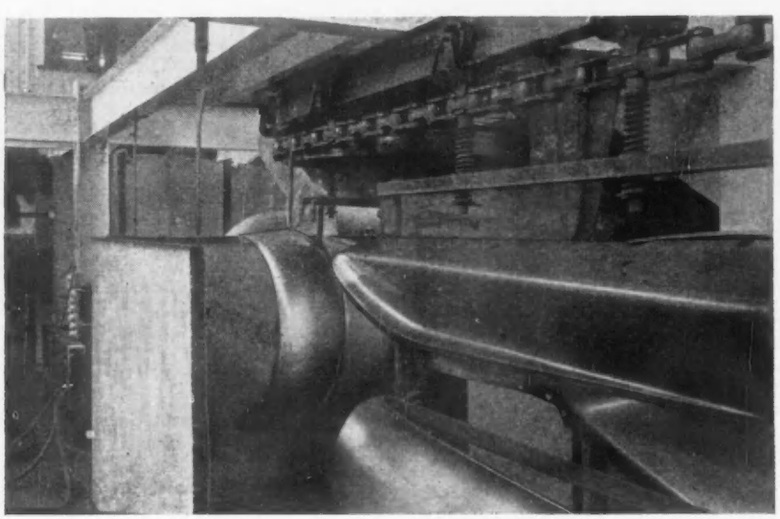
Bonderite is a concentrated chemical in powder form which, when dissolved in boiling water, forms a solution reacting quickly upon immersed iron or steel, converting the surface, it is explained, to a non-metallic coating that is a part of the metal. The coating is opaque, uniform in color and forms a primer for the final enamel finishes. It is a crystalline phosphate coating and, it is stated, the wet enamel forms a lasting bond by penetration among the intercrystalline spaces.

Photomicrograph of cold-rolled steel before it has been Bonderized.



Photomicrograph of the steel after the Bonderizing process.

Before parts are treated, they are cleaned with an alkaline wash and hot water rinse. After they pass through the process, their surfaces are wiped with a tack rag before applying the final finish. The amount of protection given was tested on the finish of fenders under salt spray by the Ford company. This test showed that they were in perfect condition at the end of 500 hr.



Sheet metal parts are hung on a conveyor for the 10-min. trip through the Bonderizing tank at the Rouge plant of Ford Motor Co.

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Fay & Scott, Dexter, Me., in commemoration of its fiftieth anniversary in business, has issued a booklet briefly relating the development of the company. Founded in 1881 by Norman H. Fay in partnership with Walter Scott for manufacturing wood-turning lathes, the business soon was extended to metal-turning lathes, machine tools and special machinery. In 1896 the partnership was dissolved, the business continuing under the direction of Mr. Fay and his son, W. L. Fay, and four years later it was incorporated, with the senior Fay as president and his son as vice-president. Following the death of his father in 1919, W. L. Fay was made president and P. S. Plouff vice-president, under which management the business is now conducted.

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Udylite Process Co., 3220 Bellevue Avenue, Detroit, has opened an office at 205 Wacker Drive, Chicago. L. A. Davies is in charge of sales, and R. F. McGuire is in charge of service.

Coats Mild Steel with Rustless Alloys

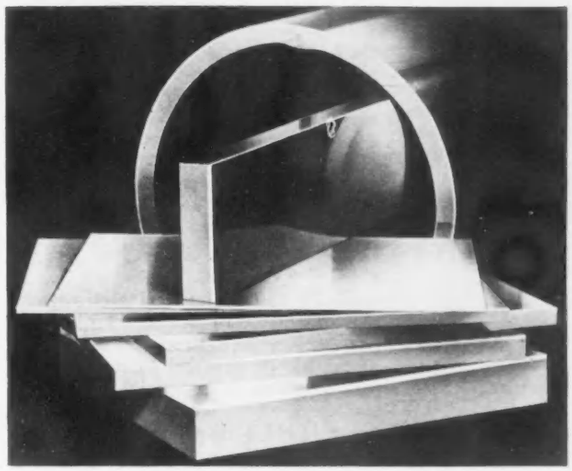
WELDING a coating of various rust-resisting alloy steels to mild steel is reported as accomplished commercially by Industrial Welded Alloys, Inc., 225 Broadway, New York. The new product has been given the trade name Plykrome. The process is the result of experiments started in 1927, in building stainless steel linings for tanks and other equipment to effect a maximum economy of the expensive alloys.

To eliminate the high cost of creating a floating type of liner and to overcome the difficulties of the difference in expansion, the company applied itself to research which, it is announced, has culminated in the perfection of "a composite metal in which a stainless alloy is veneered and completely weld-bonded to a mild steel slab, billet or bar, and then rolled on a mill to form an integral plate or sheet."

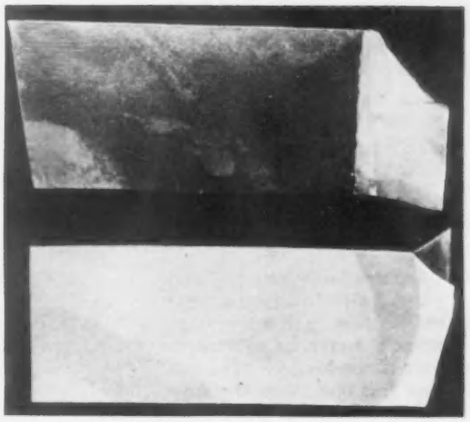
This composite metal has been produced with a rustless alloy component of the analyses required, 14 to 18 per cent or 28 to 30 per cent chromium, or 18 and 8 or 25 and 20 per cent chrome-nickel, using Allegheny Metal, Nirosta, Rezistal, KA2S, Nichrome, Hasteloy, etc. The point is made that besides being less expensive than the solid alloy, the composite metal gives greater ease and economy of fabrication. The company, in addition to its basic patent on the protection of ordinary steel with a thin integral surface of chromium alloy, has process patents now pending.

The illustrations show some of the physical tests obtainable with the metal, including how it can be bent, drawn, spun or flanged without cracking or parting the alloy from the steel. The oxidation test illustrated, while made primarily to measure the resistance of the relatively thin alloy veneer to high temperatures, is offered as evidence of the perfect bonding of the two metals.

"The ratio of alloy thickness to that of the sheet or plate can be anything that is desired. Industrial Welded



(Above) Some of the formed products capable of being made from the rustless alloy-coated mild steel.



Double surfaced Plykrome, 18 gage; sheet (below) with steel core eaten away, that shows 0.005-in. alloy ply thickness; 20 gage, (above) with steel backing gone.

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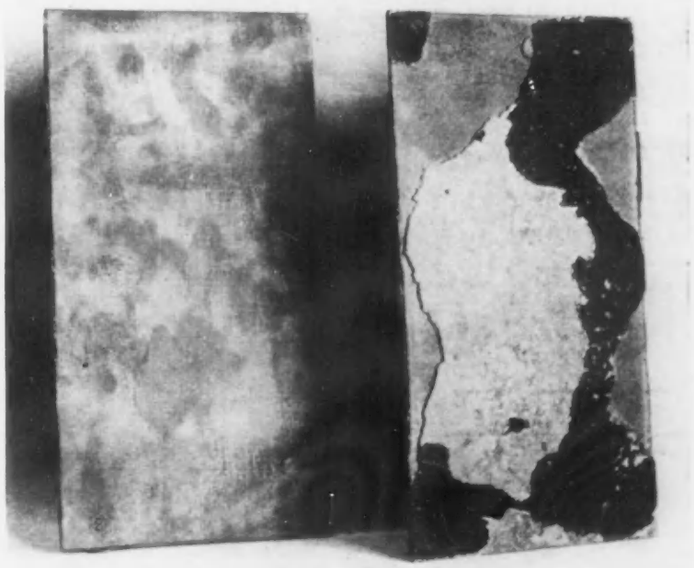
Cold bend test (90 deg.) with stainless alloy ply on outer radius. Below is a 90-deg. cold bend with stainless alloy on inner radius.



A specimen of 18-gage Plykrome exposed for some weeks to heating at 1600 deg. F. in a gas-fired furnace, then cooled and heated again; ply side unaffected.

Alloys, Inc., points out that it has made 0.010-in. gage steel strip with an alloy ply of 0.00125-in. thickness. Present practice is to recommend a ratio of approximately 1 to 15 as presenting the opportunity for best economy. In the case of heavy pressure vessels where 1-in. plate or greater thickness may be required, the ratio may be increased up to 1 to 30."

It is emphasized that the tensile strength of Plykrome is considerably greater than represented by the proportionate thickness of the alloy ply. One series of tests disclosed that, while the total thickness of the plate was increased 7 per cent by applying a veneer of alloy, the ultimate strength was augmented 25 per cent.

In producing the new product, a plate of the rustless alloy of predetermined thickness is welded to the steel slab, billet or bloom before rolling. The combination is then rolled in accordance with usual mill practice into plates, bars, sheets, etc. The alloy surface is then sand-blasted, pickled or polished, depending on its use. Equipment fabrication is to be done exclusively at Industrial Welded Alloys, Inc., plant, following the special alloy arc welding process developed by that company in the handling of the chrome-nickel steels.

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Easily Installed Conveyor Trolley and Chain

IN the steel trolley design of the Saginaw Products Corpn., the bracket assembly extends through the chain link, with the chain attachment lugs bolted directly to the bracket tongue. This tongue projects below the lower side of the chain.

This trolley is delivered to the job all ready to roll on to the track. And in attaching the chain the only operation necessary is that of raising the chain so that the bracket tongue projects through the proper link, and then bolting the attachment lugs in place.

One bolt secures both lugs and one man easily handles the operation, with no chain strains, unequalized pull or difficult bolt-hole matching necessary. As the erector is reaching up overhead in performing this operation, the simplification here effected reduces the effort.

Special heat treatment and coining of the wheel bearing races, scientific hardening of the wheel treads, rigid axle mounting, high grade of bearing balls and unusual wear resistance of the nickel steel chain make Saginaw conveyor equipment operate with a minimum chain pull, it is said. It is designed to take both horizontal curves and vertical dips without vibration or chattering.

This steel trolley operates with standard clearances on any 4-in. I-beam track, as shown in the illustration. The chain is interchangeable with the usual drop-forged 458 chain, and used on the same sprockets. Consequently it can be used both for new installations and for replacement on present installations.

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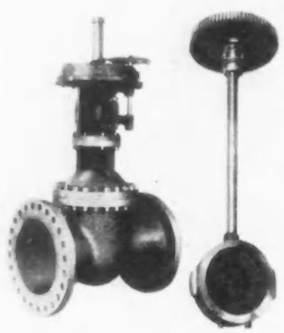
Thrust-Bearing Gate Valve

A LARGE number of gate valves identical to the one shown are installed in the 1000-mile gas line to carry natural gas from Texas into



Chicago. The diameter of the pipe is 24 in.; the working pressure, 600 lb. The valve is manufactured by National Machine Works, Chicago, especially for this class of service. It is of cast steel, measures 48½ in. from face to face, has an inside diameter of 16 in. and weighs 5000 lb. It has a total lift of 17 in.

Perhaps one of the most interesting features of this valve is the use of two Aetna ball thrust bearings. As the result of these, even with 1000 lb. unbalanced pressure on one side of the valve, it is possible to open and close it with very little effort. The thrust bearings are located in the housing, as shown, adding nothing to the total height, and are inclosed, protected against the elements, corrosion, etc.

The disks of the gate are of high-carbon steel and accurately ground. The faces of the seats are of nitro-alloy and these, also, are accurately ground, to assure a perfectly gas-tight contact and freedom from corrosion.

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New Controllers for Mill Applications

A COMPLETE line of direct-current magnetic controllers designed for heavy-duty service with series, shunt, or compound-wound d.c. motors has been developed by the Westinghouse Electric & Mfg. Co., East Pittsburgh. They are used on mill and material-handling applications such as roll tables, screwdowns, shears, bar pullers, ingot buggies, cranes, ore bridges, car dumpers, and other service in which quick and accurate stopping is necessary.

The control panel consists of an ebony asbestos lumber base supported on a substantial angle iron framework. Type SM contactors of a radically new design and high rupturing capacity are employed on these panels. Inverse time limit overload protection is provided by a new thermal overload relay, which also trips instantaneously on abnormal overloads. Relays reset instantaneously.

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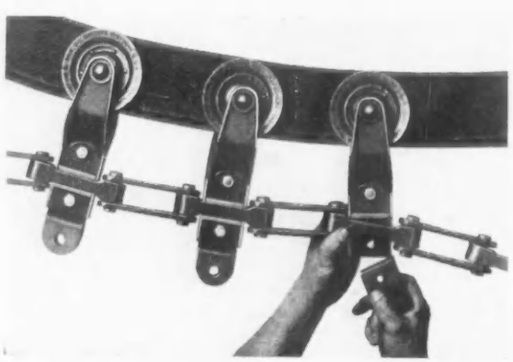
High-Temperature Cement

A SILICON-CARBIDE refractory cement for which a fusion point of over 3000 deg. F. and a minimum of shrinkage are claimed is being marketed by James E. Dick, Salem Iron Foundry, Inc., Salem, Mass., under the trade name of Heat Resisto.

Uses include laying-up of brickwork in boilers, cupolas, brass furnaces, annealing and other heat-treating ovens. The material is diluted with water to make a thick cream; the bricks are then dipped in it and tamped close, making thin joints. The face of the brickwork may then be spray or brush coated with the same material to protect the brick against flame and slag action.

The material may also be used hot or cold for monolithic linings, ladle and stove linings and for general repairs, including covering of slag-covered burned-out firebrick. It is said to contain no ground firebrick and to air set quickly, presenting a dense, hard surface.



ILLUSTRATING method of assembly of Saginaw trolley and chain, the center link being slipped up around the bracket tongue, the attachment lugs being set in place and the nut tightened on the one bolt.

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Woven Welding Rod for Production and Experimental Use

ADVANTAGES claimed for the new welding rod manufactured by the Woven Welding Wire Co., Roselle Park, N. J., include not only reliability in production operations, but unusual adaptability for producing welds of various characteristics in experimental work.

This patented welding rod or electrode consists of a base or solid core around which is woven a number of strands of fine wire, the interstitial pockets being filled with an arc-sustaining or slag-producing flux. By varying the metal used in the weave practically any alloy combination desired can be obtained. The weave aids in holding the flux to the wire in the same manner as metal lath holds plaster on a wall.

Thickness of flux coating, which has a decided bearing on the elongation, ductility and tensile strength of the weld, may be varied through the use of smaller and larger diameter weave. For example, woven material made up of 0.028 in. fine wire will give a coating thickness of 0.056 in. around the base wire, due to the crossing of the strands during the weaving operation. In the case of low and medium-carbon steels, welds having an elongation of 25 to 30 per cent in 2 in. are said to be obtained; this is attributed to the complete envelopment of the filler material transfusing the arc in electric welding and reaching the fusion state in autogenous welding.

Weave Integral with Core

The advantages of a heavily coated or flux extruded wire have been long known, particularly for welding oil and gas lines, where welds have consistently tensiled 65,000 to 75,000 lb. per sq. in. But this application, it is pointed out, has been a manual one, because the flux or slag producer in being non-conducting eliminates its use in an automatic metallic arc welding unit, as the feed rolls carry one side of the polarity. In the woven wire here described, the weave of which is integral with the base core and the flux a part thereof, the advantages of the manual operations referred to are now obtainable with automatic arc welding equipment. The woven wire is continually in contact with the feed rollers, and this, it is stated, enables the core, which has an equal flux thickness throughout its length, to carry the current.

For welding the non-corrosive or austenitic group of steels, protective fluxes are a necessity, as oxidation of the essential elements in this type of steel is much more rapid than in carbon steels. The woven welding rod, it is pointed out, with its coating firmly keyed to the base and entirely surrounding the core, effectively prevents oxidation and porosity due to the even distribution of flux. For surfacing tungsten carbide on steel, it is claimed that welds having a hardness of 69, Rockwell C scale, have been produced, the woven welding rod being a combination of high-carbon steel and tungsten.

For experimental purposes, the woven rod can be furnished with a definite number of strands consisting of one or more elements woven on the core, enabling the deposit of weld metal of any analysis desired. Thus, it is claimed, is made available a means of experimenting unobtainable through ordinary channels, and at relatively low cost.

It is intended to market this patented welding wire through distributers, and to maintain an engineering department to cooperate with companies desiring to develop welding alloys to meet special applications.

Strands of fine wire are woven around a solid core, and the pockets filled with flux. By varying the metal weave various alloy combinations are obtainable to meet particular welding requirements.

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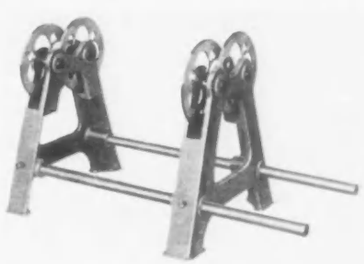
Offers Highly Sensitive Balancing Stand

SUNDSTRAND MACHINE TOOL CO., Rockford, Ill., has added to its line of balancing tools a "super-sensitive" stand for use in the balancing of light weight parts such as



aluminum fans, motor armatures, etc. Accurately balanced knife-edged steel disks are mounted on hardened steel spindles that revolve on steel balls inclosed in hardened and ground races of special design. The spindles have a direct pivoting action on the ball bearings, a feature that provides unusual sensitivity. The equipment is portable and leveling is not necessary before use.

The manufacturer claims that the tool provides such sensitivity that a 1½-lb. disk can be thrown out of balance by a 5-grain weight on a 3-in. radius and that it is possible to obtain satisfactory results when dynamic balancing is too slow or expensive to be employed. The tool has a swing of 22 in., a maximum distance between standards of 20 in., and a capacity of 12 lb.; it weighs 40 lb.

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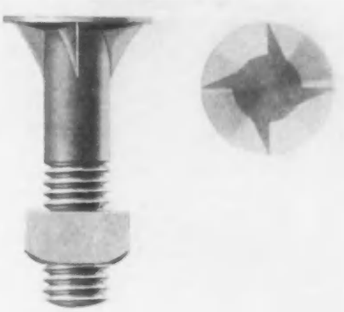
Non-Turning Bolt for Wood Construction

"SEAL-TITE" bolts, suitable for various types of wood construction and especially for attaching smooth lining and decking to box cars and other equipment, are being marketed by the Lewis Bolt & Nut Co., Minneapolis. To hold the bolt from turning, it is provided with four fins on the shank, so designed that the surface of the fin bearing against the wood in tightening is on a radial plane. This design, shown in the accompanying phantom view, is intended to produce the maximum holding power against turning and to avoid splitting action.



A water-tight connection is provided by the pressure of the tapered surface of the head against the wood fiber. The head is sufficiently thin to countersink flush with the surface of the wood; its tensile strength tests higher than 50,000 lb. per sq. in. The bolts, which can be driven into the wood with an ordinary hammer blow, are available in sizes ranging from ¼ to ¾-in. diameter and lengths from 1 in. The company's Eastern representative is G. A. Prendergast, 2 Rector Street, New York.

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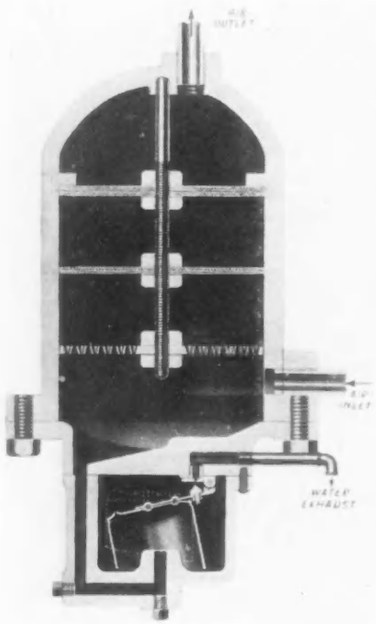
Norma-Hoffman Bearings Corpn., Stamford, Conn., has established a sales office at 1014 American Bank Building, Parkway and Walnut Street, Cincinnati. C. D. Kilham, for many years sales engineer at the home office and later at the Cleveland office, has been made manager.

Removes Water from Air Lines

AN automatic trap for removing moisture from air supplied to pneumatic tools and other pneumatic equipment has been announced by James A. Murphy & Co., Hamilton, Ohio.

As indicated in the accompanying sectional illustration, air enters the lower part of the device at a tangent, thus receiving a whirling motion, said to precipitate at once about 75 per cent of the moisture. The air



then passes through fine holes in the first baffle plate and ascends through finely graduated bronze screens to the outlet at the top. This action is said to remove virtually all of the water and oil present in the air.

The fluid removed from the air drains into a lower trap section from which it is ejected through an automatic valve controlled by means of a bucket float, the only moving part. This valve and its seat are made of heat-treated chrome steel. The housings are high grade gray-iron castings; the baffles and other interior parts are of bronze. The device is suitable for 1-in. and smaller air lines.

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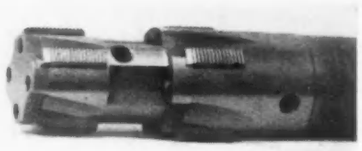
Combination Tool Taps Two Holes at Once

THE Geometric Tool Co., New Haven, Conn., has brought out a combination solid adjustable tap, the accompanying illustration of which shows one of the innumerable combinations which may be employed. This tool is equipped with ground



thread chasers for tapping 2 1/16 in.-14 and 2 11/32 in.-14 U. S. thread form.

The two taps are independent of each other and have individual size adjustment control. Thus both holes may be tapped to the required decimal size. If desired the front tap may be removed and the back tool employed as you would any solid adjustable tap.

The taps themselves are made of alloy steel, and are hardened and ground throughout. They are of simple construction, consisting only of the tap body, cap, plunger and adjusting screws. Size adjustment is positive and can be quickly locked in place.

Geometric combination solid adjustable taps can be equipped with ground thread chasers (in U. S., V, and American Briggs thread forms) or with machine cut chasers. The two tapped holes must be of the same pitch and preferably should be through holes.

The particular tap here shown is used on a chucking machine, but similar tools can be employed on any machine that can use a solid adjustable tap. With this arrangement two operations can be completed in approximately the time of the longest of the two tapping operations.

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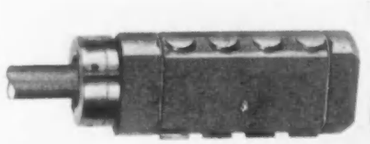
Tool for Finish Boring Prior to Honing

FOR rapid finish boring or for preparing rough-machined bores for honing, the "Revociper," a tool designed to operate with a combined revolving and reciprocating motion, has been brought out by the Hutto Engineering Co., Detroit. The tool comprises a number of blades inserted in holders and held in position by soft metal that provides a cushion to protect the tool from the resistance of hard spots in the bore. For diameters greater than 4½ in., the tools are interchangeable with the company's honing equipment.

Work for which the Revociper is suitable includes gun liners, cold drawn seamless steel, brass and



Monel metal tubing, cast-iron and nickel-iron pipe, Nitralloy liners and forged steel tubes. Bore diameters range from 1⅝ to 10 in., and lengths up to 65 ft.

The maximum depth of cut does not exceed 0.002 in. For work requiring only a true bore such as ship propeller shafts and high speed rotor shafts, the honing operation can be eliminated. A high satin finish is produced by permitting six complete reciprocations of the head after size is obtained, slightly reducing the traversing speed so that new helical cutting paths are formed.

A special fixture is obtainable for regrinding the cutting edges of the blades for bores from 1⅝ to 4 7/16 in. diameter. Larger sizes may be ground in the body in which they are used.

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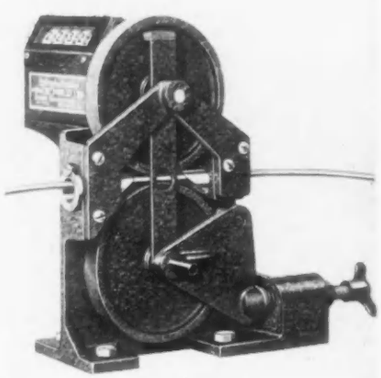
Wire-Measuring Machine with Automatic Brake

THE Durant Mfg. Co., maker of Productimeter counting machines, has developed a wire-measuring machine or meter featuring an automatic brake. The braking is accom-



plished by means of a sturdy spring, the tension of which is adjustable to accommodate various thicknesses of wire. The leather brake shoe can be replaced quickly and easily.

Measuring wheels with straight milled, cross knurled, or a composition rubber surface, for accommodating different types of material to be measured, can be furnished. These wheels, like the entire frame, are made of cast iron and run on a bearing equipped with oilers. The frame, brackets and counting mechanism case are finished in baked black enamel and are impervious to moisture and resulting rust.

This measuring meter can be furnished with the counter facing front, back or to the side of the measuring device, operating in either clockwise or anti-clockwise rotation. It operates at speeds ranging from 400 to 600 ft. per min. and measures wire and similar material ranging from 0.005 to ½ in. in thickness.

Improved Welders' Goggles

WELDERS' goggles of improved type have been placed on the market by the Linde Air Products Co., 30 East Forty-second Street, New York.

These goggles, designated as the Oxweld No. 12, are designed to fit

the eyes and are adjustable to conform to the individual nose, thereby assuring comfort. The edge of the cup that makes contact with the face is shaped to conform to the general contour of the cheekbone and nose, thus fitting smoothly around the eyes. The eye-pieces are joined by a leather strap, adjusted by means of a metal buckle, so that they may be correctly spaced to the width of the face. Patented ventilation ports on each side of the eye-cups are so constructed that it is impossible for sparks or light to reach the inside of the cup. The depth of the cup permits ample circulation of cool air.

Field of vision has been increased by the use of 50-mm. diameter lenses instead of the usual 47-mm. lenses. Brown color lenses, known as the "B" type, are available, and in addition a new special green lens, known as the "A" type, is obtainable in three different shades. Lenses may be changed easily. These goggles are made of a molded plastic substance known as Oxweldite which is formed over a fabric base and is resistant to heat, light and electric current.

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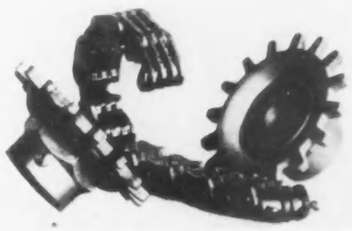
Coupling for Shafts Up to 1-In. Diameter

AS a practical coupling that can be supplied at low cost, the new Morse midget is a miniature counterpart of the Morse chain-and-sprocket coupling used on installations up to 5000 hp. The manufacturer, Morse Chain Co., Ithaca, N. Y. (division of Borg-Warner Corpn.), says that the simple design—two sprockets wrapped by a chain—has withstood the most strenuous tests in constant operation in numerous lines of business over a period of years. The new midget coupling, designed for shaft sizes up to 1 in. in diameter, is said to be very efficient, due to a lack of complicated parts.



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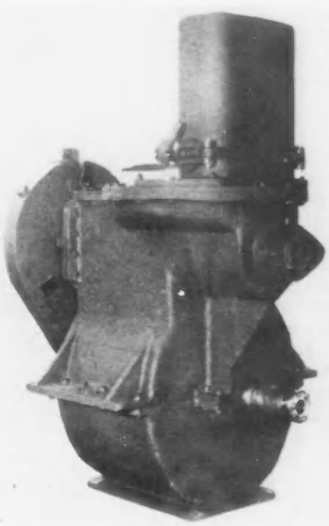
Flue Dust Conditioner

A FLUE-DUST conditioner developed by Edgar E. Brosius, Inc., Pittsburgh, for the treatment of finely pulverized material was designed primarily for treating flue dust at blast furnace plants. It can be adapted also to dust problems in the field of nonferrous metallurgy.

In the unit here shown the dust is conditioned directly at the dust catcher and is made ready for the sintering plant. The sensible heat is



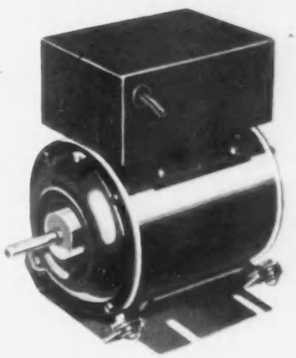
DUST is agitated and mixed with water, in preparing it for the sinter bed.

removed and the dust conditioned by being passed through a rotating cage, where it is agitated and mixed with water. Sludge water, 40 to 60 per cent solids, directly from the gas cleaner equipment may be used with this conditioner, eliminating the filter. Any degree of moistening can be obtained by regulating the supply of water.

Practically no free dust escapes, and the dust cloud which is present when emptying untreated dust is eliminated. Because of the absence of free dust, the cost of maintenance of equipment is said to be greatly reduced.

Fractional Motors for Industrial Use

FRACTIONAL horsepower motors, from 1/10 to 1/3 hp., are offered by Howell Electric Motors Co., Howell, Mich. This line consists of condenser start, split-phase and polyphase mo-



tors, all built in a frame with the same mechanical dimensions.

Condenser motors, type CI, are high-starting-torque constant-speed motors having, at full voltage, a starting torque of 300 to 400 per cent of full-load torque, and a maximum running torque of at least 200 per cent of full-load torque. Starting current on these motors are within NELA limits, and the running characteristics (efficiency and power factor) meet NELA performance requirements.

These motors are of squirrel cage construction, without commutator or wire-wound rotor. As a consequence there is very little to get out of order, and they are said to eliminate radio interference.

Split-phase motors are built in the same frames as the condenser motors, and conform to both the short-hour and long-hour ratings. They are built with either ball or sleeve waste-packed bearings, in the same mechanical dimensions. The steel frame is splash proof, and well protected against the entrance of dirt and other foreign material.

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Compact Centrifugal Pump

THREE new sizes have been added to its line of "SSU" centrifugal pumping units by Allis-Chalmers Mfg. Co., Milwaukee. These single-shaft,

two-bearing designs now include ratings from 30 to 500 gal. a minute, for heads under 100 ft.

Recent adoption of total inclosure of motor housings on the pump end of these units and the use of totally inclosed fan-cooled motors, if necessary, permits their use for severe service conditions. "SSU" pumps are designed especially for heads heretofore not adequately covered by a low-price, guaranteed, high-grade pump.

Some applications of these pumps are for: water supply; circulation of water, oil or brine for heating or cooling systems; transfer of many liquids; air conditioning; bottle washing; washing machinery; drainage systems and swimming pools.

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Right-Angle Geared-Head Motor

BUILT in sizes from 1/30 to 5 hp., single-phase and direct current; 1/30 to 10 hp., polyphase, with interchangeable frames for the same horsepower and speed in different types of current, a right-angle drive geared-head motor has been put out by Master Electric Co., Dayton, Ohio.

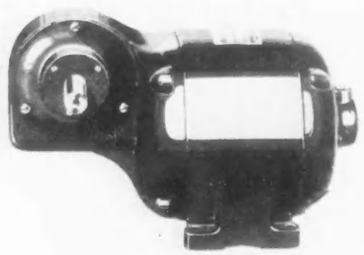
Standard ratios on which prompt delivery is obtainable include 8:1, 12:1, 18:1, 24:1, 30:1, 36:1, 48:1, 60:1, 72:1. Practically any ratio between minimum and maximum can be obtained on order.

These motors are equipped with anti-friction bearings throughout, with precision ball bearings on the motor shaft and selected roller bearings on the slow-speed shaft. This construction permits mounting in any position, without change in construction.

Worm gear is manganese bronze of a composition specially developed for this service. Uniformity is maintained by close supervision of analysis. Worm is made of high-carbon steel, processed to insure long life.

Through the use of a unique oil-seal arrangement, assurance against leakage is obtained. Because of this feature, lubricant need be added only once in every 1000 hr. of operation.

Worm-gear housing can be arranged so that shaft projects in any one of eight different positions. On either side of the housing, with the housing at the top or bottom on the vertical center-line, or to the right or left on the horizontal center-line.



EIGHT positions may be had for the projecting shaft of this geared-head angle motor.

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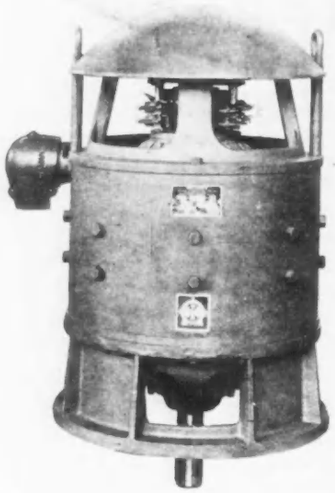
Direct-Current Vertical Motors

DIRECT-CURRENT motors for vertical operation, in sizes up to 50 hp., 1150 r.p.m., are offered by Reliance Electric & Engineering Co., Cleveland. These motors have a ring base for mounting. A drip cover protects them from falling dirt, chips, water, oil or other injurious solutions.



Where it is desirable, the motor can be mounted direct to the machine being driven, without the ring base, thus appearing as an integral part of the machine.

Amply large bearings are used to take up the thrust load or weight of the armature. Two heavy eye-bolts make handling easy. In all other ways the construction is the same as the Reliance Type T, direct-current, heavy-duty motor for horizontal operation.

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High-Carbon Electrode for Building Up Worn Steel

DIFFICULTIES usually met when welding with high-carbon electrodes have been eliminated by a special coating, according to the Lincoln Electric Co., Cleveland, which has developed an electrode for building up worn steel surfaces.

This electrode, designated as the Hardweld, contains about 1.00 per cent carbon and is offered for use in building up cupped or worn rails, locomotive tire flanges, carwheels, oil-well drill bits, tractor shoes, dipper teeth, dies and other wearing surfaces. The weld produced has a tough, dense surface of moderate hardness. The special coating is said to eliminate the objectionable "wildness" of the arc, characteristic of ordinary high carbon welding wire; and to eliminate the boiling and resulting porosity usual in a high-carbon deposit. It also regulates the analysis of the deposit by controlling oxidation and variations of the arc length.

Deposited on straight high-carbon steel and allowed to cool naturally, the Hardweld has a hardness of 30 to 45, Rockwell C scale; 40 to 61, Scleroscope; and 290 to 425, Brinell. An even harder surface may be built up if the bead is peened and a still higher Rockwell C may be obtained by quenching the deposit with cold water. Tests made by depositing a bead of Hardweld on 0.60 per cent carbon steel using a 3/16-in. electrode at 200 amp. showed the following Rockwell C scale readings: Cooled naturally, 33; peened, 40; and quenched (from 1450 deg. F.), 50.

It is stated that this new material should be used with reversed polarity; that is, the electrode should be on the positive side of the generator, and an extremely low arc voltage, 20 to 25 volts, will give the best results. The range of current values is wide and can be adjusted for the particular work, although the 3/16-in. electrode is best at 150 to 225 amp. and the ¼-in. electrode at 225 to 350 amp.

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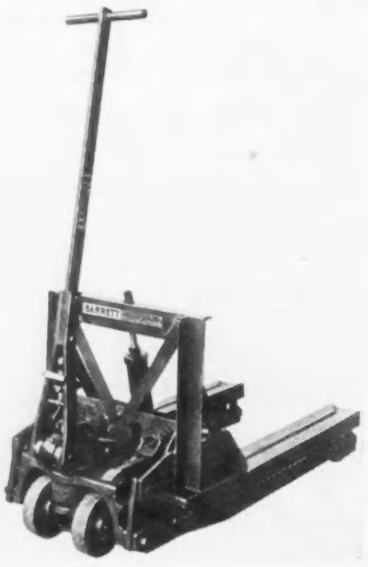
Lift Truck Designed for Tin Plate

A NEW hand-power lift truck is being put out by Barrett-Cravens Co., 101 West Eighty-seventh Street, Chicago, designed especially for handling tin plate. The unit is of the fork type, built 3½ in. high, to go under stacks of tin plate shipped on 2 x 4-in. blocks.

With the lift truck a pile of tin plate is lifted and trucked from freight car to the desired storage space in the plant, avoiding hand piling in the car and unpiling in storage.



Steel Treaters Offer 55 Papers

Comprehensive Technical Program of Four Technical Societies for National Metal Week

FIFTY-FIVE technical papers appear on the program which the American Society for Steel Treating has prepared for its sessions of the forthcoming National Metal Congress in Boston the week of Sept. 21. This is the largest number of papers ever scheduled on an A. S. S. T. program, according to Ray T. Bayless, secretary of the publication committee of the society. National Metal Congress programs of the American Institute of Mining and Metallurgical Engineers, American Society of Mechanical Engineers and the American Welding Society will also be larger than usual.

The technical program of the A. S. S. T. lists the following papers:

"Solubility of Oxygen in Solid Iron" by N. A. Ziegler, Westinghouse Electric & Mfg. Co., East Pittsburgh.

"Hardness of Chromium as Determined by the Vickers-Brinell, Bierbaum, and Mohs Methods," by Richard Schneidewind, University of Michigan, Ann Arbor, Mich.

"Dendrites in Nickel Steel," by Albert Sauveur, Harvard University, Cambridge, and E. L. Reed, American Sheet & Tin Plate Co., Pittsburgh.

"The Characteristics of Deformation of Steel Under Constant Load at Elevated Temperatures," by G. R. Brophy, General Electric Co., Schenectady, N. Y.

"Some New Aspects of the Iron-Carbon Diagram," by H. A. Schwartz, National Malleable & Steel Castings Co., Cleveland.

"Correlation of the Crystal Structures and Hardnesses of Nitrided Cases," by O. E. Harder and G. B. Todd, Battelle Memorial Institute, Columbus, Ohio.

"The Resistance to Wear of Carbon Steels," by S. J. Rosenberg, United States Bureau of Standards, Washington.

"Endurance Properties of Some Well-known Steels in Steam," by T. S. Fuller, General Electric Co., Schenectady, N. Y.

"Corrosion Resistant Steels," by R. L. Duff, Standard Oil Development Co., Elizabeth, N. J.

"Surface Energy of Iron Carbide," by Yap, Chu-Phay, 27 Grove Street, New York.

"Comparison of Sheet and Strip Steels for Difficult Stampings," by E. S. Lawrence, Duraloy Co., Pittsburgh.

"Nature of Abnormal Grain Growth in High-speed Steel," by G. R. Brophy and R. H. Harrington, General Electric Co., Schenectady, N. Y.

"Aging in Low-Carbon Steels," by A. Allan Bates, Case School of Applied Science, Cleveland.

"Cemented Tantalum Carbide," by Floyd C. Kelley, General Electric Co., Schenectady, N. Y.

"Nondeforming Alpha-Delta Carburizing Steel," by A. B. Kinzel, Union Carbide & Carbon Research Laboratories, Long Island City, N. Y.

"Behavior of Some Irons and Steels Under Impact at Low Temperatures," by Robert Sergeson, Republic Steel Corpn., Massillon, Ohio.

"Influence of Grain Size on the Properties and Corrosion Resistance of the 18-8 Iron-Chromium-Nickel Alloy for Elevated Temperature Service," by H. D. Newell, Babcock & Wilcox Tube Co., Beaver Falls, Pa.

"Plastic Drawing of Sheet Steel Into Shapes," by E. V. Crane, E. W. Bliss Co., Brooklyn.

"Short-Time Nitriding," by J. J. Eagan, Union Carbide & Carbon Research Laboratories, Long Island City, N. Y.

"Scaling of Steel at Elevated Temperatures by Reaction with Gases and the Properties of the Resulting Oxides," by D. W. Murphy and Wm. P. Wood, University of Michigan, Ann Arbor, and W. E. Jominy, A. O. Smith Corpn., Milwaukee.

"Thin Strip Steel for Deep Drawing," by H. T. Morton and I. A. Rummler, Hoover Steel Ball Co., Ann Arbor, Mich.

"Some Physical Properties of High-Speed Steel," by J. V. Emmons, Cleveland Twist Drill Co., Cleveland.

"Thermomagnetic Phenomena in Steel," by R. L. Sanford, United States Bureau of Standards, Washington.

"The Cold Treatment of Certain Alloy Steels," by G. V. Luerssen and O. V. Greene, Carpenter Steel Co., Reading, Pa.

"Characteristics of Alloyed Cast Iron," by F. W. Shipley, Caterpillar Tractor Co., Peoria, Ill.

"Impact Characteristics of Steel Rails at Low Temperatures," by J. F. Cunningham and James Gilchrist, University of Manitoba, Winnipeg.

"Manufacture Properties and Uses of 18-8 Chromium-Nickel Steel Wire," by W. H. Wills and J. K. Findley, Ludlum Steel Co., Dunkirk, N. Y.

"Precious Metal Alloys," by R. C. Brumfield, Cooper Union, New York.

"Identification of Inclusions," by Leland E. Grant, Chicago, Milwaukee, St. Paul & Pacific Railroad, Milwaukee.

"Effect of Heat Treatment Upon Ferrite Banding of Steel," by W. E. Harvey and Bradley Stoughton, Lehigh University, Bethlehem, Pa.

"Effect of Normalizing Upon the Grain Structure and Physical Properties of Automobile Sheet Steel," by William F. McGarrity, Youngstown Sheet & Tube Co., and H. V. Anderson, Lehigh University, Bethlehem, Pa.

"Influence of Special Elements on the Carbon Content of the Iron-Carbon Eutectoid," by E. L. Reed, American Sheet & Tin Plate Co., Pittsburgh.

"Further Studies on Chromium-Nickel-Iron and Related Alloys," by V. N. Krivobok, E. L. Beardman, H. J. Hand, T. O. Holm, A. Reggiori and H. S. Rose, Carnegie Institute of Technology, Pittsburgh.

"Inspection of Welds With Gamma Rays," by Gilbert E. Doan, Lehigh University, Bethlehem, Pa.

"Alloys of Iron, Manganese and Carbon," by F. M. Walters, Carnegie Institute of Technology, Pittsburgh.

"The Role of Energizers in Carburizing Compounds," by George M. Enos, University of Cincinnati, Cincinnati.

"Tool Steel from the Consumers' Standpoint," by H. G. Keshian, Chase Companies, Inc., Waterbury, Conn.

"Melting of Tool and Other High-Grade Steels in the Basic Electric Furnace," by J. P. Gill and R. E. Trembour, Vanadium Alloys Steel Co., Latrobe, Pa.

"Ghost Lines in Forgings," by J. F. Harper and H. J. Stein, Allis-Chalmers Mfg. Co., Milwaukee.

"Age Hardening Phenomena in Typical Fusion Weld Metal," by F. R. Hensel and E. J. Larsen, Westinghouse Electric & Mfg. Co., East Pittsburgh.

"Open Hearth Process," by C. H. Herty, Jr., United States Bureau of Mines, Pittsburgh.

"Aqueous Solutions of Ethylene Glycol Glycerine and Sodium Silicate as Quenching Media," by T. E. Hamill, United States Bureau of Standards, Washington.

"Melting of Crucible Tool Steel," by Owen K. Parmiter, Firth-Sterling Steel Co., McKeesport, Pa.

"Lubricants Used in Deep Drawing of Sheet Steel," by Maurice Reswick, Pennsylvania Lubricating Co., Pittsburgh.

"Data on Steel Made Without Manganese," by Captain S. B. Ritchie, Watertown Arsenal, Watertown, Mass.

"Some Effects of the Amount and Rate of Deformation on a Low-Carbon Strip Steel," by Joseph Winlock and A. E. Lavergne, Edward G. Budd Mfg. Co., Philadelphia.

"Making of Acid Electric Steel for Castings," by George Batty, Steel Castings Development Bureau, Philadelphia.

"Ingots, Ingot Molds and Castings," by G. A. Dornin, Baltimore.

"Thermomagnetic Investigations of Tempering of Quenched 0.75 Per Cent Carbon Steel," by C. A. Ellinger, United States Bureau of Standards, Washington.

"Division of the Iron-Vanadium-Oxygen System into Some of Its Constituent Binary and Ternary Systems," by C. H. Mathewson, E. Spire and C. H. Samans, Yale University, New Haven, Conn.

"Magnetic and Mechanical Hardness of Dispersion Hardened Iron Alloys," by K. S. Seljesater and B. A. Rogers, Western Electric Co., Chicago.

"Development of Italian Industry Making Special Steels and Irons," by Federico Giolitti, Torino, Italy.

"Photomicrographs of Steels with One Per Cent Carbon Arranged in Graded Series for Use as Standards," by Haakon Styri and H. O. Walp, S K F Research Laboratories, Philadelphia.

"The Evaluation of the Drawing Quality of Extra Deep Drawing Sheets," by Thomas Dockray, Eastern Rolling Mill Co., Baltimore.

The last 17 papers of this program will not be pre-printed.

Sessions by Other Societies

SOME of the papers scheduled for the sessions of the iron and steel division and the institute of metals division of the American Institute of Mining and Metallurgical Engineers have been announced and are as follows:

Iron and Steel Division

"Metallurgical Fundamentals, Present and Future," by Charles C. Maier.

"The World of Metallurgy," by John A. Mathews.

"Low-carbon Steels," by H. B. Pulsifer.

"Magnetic Properties vs. Allotropic Transformations of Iron Alloys," by T. D. Yensen and N. A. Ziegler.

"The Composition Limits of the Alpha-gamma Loop in the Iron-tungsten System," by W. P. Sykes.

"Dilatometric Study of Chrome Nickel Iron Alloys," by V. N. Krivobok and Maxwell Gensamer.

"Transformational Characteristics of Iron-manganese Alloys," by Howard Scott.

"Inclusions and Their Effect on Dynamic Strength of Steel," by A. B. Kinzel and Walter Crafts.

On Thursday morning, Sept. 24, the division will hear a lecture by Prof. P. W. Bridgeman of Harvard on the subject of modern physics. Educators will be especially interested in the symposium on metallurgical education on Friday afternoon led by Prof. G. B. Waterhouse, and based on the paper, "The World of Metallurgy," by John A. Mathews.

Institute of Metals

Members of the institute of metals division will have two sessions for the presentation of their own papers and discussion of problems, in addition to the joint session with the iron and steel division; one meeting will be on copper and copper alloys, and the other will be general. The institute of metals papers will be:

Copper and Copper Alloys Session:

"Some Important Factors Controlling the Crystal Macrostructure of Copper Wire Bars," by L. H. DeWald.

"Copper Embrittlement," by L. L. Wyman.

"Effect of Secondary Copper on the Metal Market and Its Relation to Domestic Production and Consumption," by Percy E. Barbour.

"An Alpha-beta Transformation in a Hot-forged Brass Shape," by Robert S. Baker.

"Equilibrium Diagram of the Copper-rich Copper-silver Alloys," by Cyril Stanley Smith and W. Earl Lindlief.

General Session:

"Influence of Stress on Corrosion," by D. J. McAdam, Jr.

"Preferred Orientation Produced by Cold Rolling in Sheets of Aluminum, Nickel, Copper and Silver," by Cleveland B. Hollabaugh and Wheeler P. Davey.

"Relation of Crystal Orientation to the Bending Qualities of a Rolled Zinc Alloy," by Gerald Edmunds and M. L. Fuller.

"Seasonal Variation in Rate of Impingement Corrosion," by Alan Morris.

Joint Session:

"Some Developments in High-temperature Alloys in the Nickel-cobalt-iron System," by C. R. Austin and G. P. Halliwell.

"Preparation of a Uniform Abrasive for Metallographic Polishing," by J. L. Rodda.

"Age-hardening Copper-titanium Alloys," by F. R. Hensel and E. I. Larsen.

"Age-hardening of Austenite," by F. Hensel.

A further feature will be a non-technical talk, "Molybdenum," by Alan Kissock, vice-president, Climax Molybdenum Co., at the joint dinner of the two divisions.

American Welding Society

The American Welding Society plans a series of six sessions with interesting papers at each. The subjects to be discussed are: Manual and automatic welding, welding of non-ferrous metals, corrosion resistant steels, welding of machine parts, annealing, welded piping, welding in ship construction, welding structural steel, and other general applications. On Monday the first session will be the meeting of the special committee on steel welding.

Campbell Memorial Lecturer

The 1931 Edward deMille Campbell memorial lecture will be delivered by Dr. Charles H. Herty, Jr., supervising chemist, metallurgical department, United States Bureau of Mines, Pittsburgh.

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Determination of Oxygen and Nitrogen by the Vacuum Fusion Method

An extended study of a method for the determination of oxygen and nitrogen in steels will be described in the August number of the Bureau of Standards *Journal of Research*. In this method the sample is melted in an evacuated furnace heated by induced high frequency currents. The gases which are evolved from the molten sample are withdrawn from the furnace and circulated through an analytical train by means of a mercury vapor diffusion pump. The use of this diffusion pump, simplification of the analytical train, and the use of a sample loading device constitute improvements over the apparatus previously described. The method (in the absence of interferences) gives values reproducible to within 0.002 per cent for either oxygen or nitrogen. Interferences in the oxygen determination, caused by the presence of reactive metallic vapors or difficultly reducible oxides, are discussed. No such interferences have been observed in the determination of nitrogen.

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Inland Steel Co., Chicago, now has for distribution a new edition of the booklet "Inland Open-Hearth Sheet Steel Products," which contains all the information, brought up to date, ordinarily needed for ordering steel sheets. Standard extras and differentials, sheet weights and bundling tables, standard commercial tolerances, and trade customs and practices are included. The booklet is coat-pocket size and contains 56 pages of condensed data.

Some Building Gains Recorded in July

Moving slightly against an established seasonal trend, several sections of the country produced higher construction contract awards in July than in June. The F. W. Dodge Corpn. finds that the New England, upstate New York, Middle Atlantic, Pittsburgh and Chicago territories are included in this category.

Despite a decline in the total valuation of such contracts in the 37 States east of the Rockies, these large areas registered a go-ahead over June in July, when they would normally be expected to drop behind June. The total for July was $285,997,300, and was divided among the three major construction classes as follows: $116,265,500 in public works and utilities; $105,839,500 in non-residential building; $63,892,500 in residential building.

In the advancing territories the lead was largest in the Middle Atlantic territory (eastern Pennsylvania, southern New Jersey, Maryland, Delaware, District of Columbia and Virginia), where July's $40,464,600 compared favorably with June's $32,128,800. Only a slight advance was shown in upstate New York, with $14,296,000 for July, comparing with $14,024,000 for June. New England showed a gain of about three millions in its $28,865,300 July total. The region around Chicago registered $34,906,500 in July and $28,122,200 in June. Exactly $96,000 was the advance of the Pittsburgh territory, as included in its $32,096,700 for the month just ended.

The New Orleans territory was alone among the thirteen to show a July gain in total construction over July, 1930. The increase shown in the month's $17,334,500 was due to gains in civil engineering and non-residential building.

Both the Chicago and New Orleans areas showed increases in non-residential building over July, 1930.

Civil engineering undertakings for the first seven months of the year gained over the same period of 1930 in the New England, Central Northwest, New Orleans and Texas territories.

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Central Iron & Steel Has Not Cut Wages

Robert H. Irons, president, Central Iron & Steel Co., Harrisburg, Pa., informs THE IRON AGE that the statement published in the issue of Aug. 13, page 449, that his company had reduced pay of all employees 15 per cent is incorrect. Mr. Irons says that executive and office employees were put on a short-time basis some months ago and that some of the mill workers were put on an 8-hr. day, but that no change has been made in the basic hourly rates of mill labor.

Urges Unemployment Reserves

James W. Hook Says Funds Should Be Set Aside by Industries to Take Care of Stable Workers

AMERICAN industry can and must solve the national unemployment problem if compulsory public unemployment insurance is to be avoided, declared James W. Hook, president, Geometric Tool Co., New Haven, Conn., and member of President Hoover's emergency committee for employment, in an address at the first conference on management problems of the smaller industries on Aug. 13 at Silver Bay, N. Y. Mr. Hook also is chairman of the industrial committee of the New England Council.

He told the conference that maintenance of the income of stable workers for periods of depression "is the direct and pressing obligation of industry to the problem of mitigating the scourge of unemployment." Industry must bear its part of the general burden of relief for those who do not come within the definition of stable workers. It must contribute its share to charity and bear its rightful proportion for taxation to finance forwardly plans for public works.

Danger of Social Experiments

Mr. Hook asserted that the national trend of thought growing out of the depression indicates that the nation is headed toward social experiments in connection with unemployment that are destined to have far-reaching effects. Society has already learned that saving a person from starving or freezing is not enough, and that, if such humane effort destroys the person's self-respect and develops in him a permanent inferiority complex, it has made of him a continuing charge upon society and in some cases a menace as well. While solution of the unemployment problem is up to society as a whole, an important part of the solution is the definite responsibility of the industrial employer.

The burden of Mr. Hook's analysis was that stable workers must be kept on the job during periods of economic stress. "To these stable workers," he said, "industry owes all that it can safely afford to help safeguard them from unemployment and the interrupted income that accompanies it."

Mr. Hook charged that industry collectively or individually has done little to determine who its stable workers are or to determine the cost of giving them a certain amount of assistance. He emphasized that industry has made ample provision for safeguarding all inanimate assets, leaving its human assets to shift for themselves. This is done on the theory that employees must be treated as human beings and not as machines and animals.

The cry of rugged individualism "would be a compelling one if all of our citizens are endowed with equal opportunities and equal abilities. But we are not so endowed and, when the misfortune of unemployment comes, the distress that follows varies widely and increases with our economic circumstances. Industry, of course, cannot furnish safeguards to alleviate all of this distress, but it can do its part and by so doing avert having the whole burden thrust upon it."

There are about 5,000,000 unemployed persons in the United States, estimated Mr. Hook. Perhaps 10 per cent of this number are able to take care of themselves as a result of accumulated savings. He declared that 25 per cent, or 1,250,000, will not work or are otherwise unemployable; 35 per cent, or 1,750,000, are unstable or nomadic workers who do not want continuous employment; and 40 per cent, or 2,000,000, are stable employees who are settled in their habits and want to work, who are raising families and building homes, and who have established positions in the community and adopted standards of living which they desire to maintain. This class "is absolutely essential to the success of industry in normal times and it is a serious matter to them, to industry, to the community in which they live and to the nation when they are thrown out of employment.

Prior Savings of Workers Not Enough

The idea that this class should always be prepared through thrift and prior savings to weather economic storms is only partly justified, said Mr. Hook. Illness, inability to earn an adequate sum to enable them to create a surplus, insufficient earning period prior to the coming of a business depression and major and minor economic changes all have an effect on their preparation and well being.

Mr. Hook told the conference of a survey conducted in his own plant to determine who the stable workers are, to establish records which would help to spread available work fairly and intelligently when the factory is running short time and to obtain data to enable plant executives at the end of the depression to know accurately what reserves must be provided to tide this stable group of workers over a substantial part of the next depression if and when it comes.

How Reserve Fund Can Be Built Up

"The experience in our plant," declared Mr. Hook, "has led me to the definite conclusion that industry can, without great expense, provide reserves to tide its stable working force over extended periods of depressed business. Recently our payroll department calculated from the percentage figures already obtained what would have been necessary in the way of reserves to have maintained the wages of our stable group of employees at 80 per cent of normal for those with dependents and 60 per cent for those without for 52 weeks of short-time work. It was amazing to me to find that such a reserve would have amounted to three-quarters of 1 per cent of the payroll for the years 1923-1929 inclusive. During that same period our company provided in other reserves an equivalent of 13½ per cent of the same group of payrolls.

"After saying this, I would add that I am not forgetting seasonal variations in business and lesser depressions which come along every two or three years that would absorb some of the reserves during the period of their accumulation. Nor am I overlooking the more fundamental economic factors, such as unbridled competition and changes in buying habits and demands of the public, that cause profits in some businesses to decline to such an extent as to make a reserve as small as three-quarters of 1 per cent of the payroll a burdensome load to carry. But if all competitive units in the field were setting up an equal percentage in reserves, there would be no disproportionate lead on anyone and the charge could be added uniformly to selling prices."

With stable workers reasonably assisted by industry directly, the problem of the unstable or nomadic worker and the unemployable would not be so difficult. Every important industrial center should have its permanent planning board made up of private citizens who would list and investigate all suggestions and proposals for public improvement and have the worthy projects ready at the time when public funds must be provided for unemployment relief.

Need for Current Study of Problem

Studies to determine who its stable workers are and what it would cost to protect their incomes in definite percentages of normal pay over definite periods of time should be made by each unit of industry during the present depression, declared Mr. Hook. When the depression is over, plans for meeting the next one should be made, using these data as a basis. These plans should have as their base a stabilization program, augmented by reserve funds set aside during the next cycle of prosperous years to be used at the needed time to maintain the income of stable workers. Whether the funds are created jointly by industry and those employed by industry is a question for individual units of industry to decide. Mr. Hook favored contributions from both employer and employee, the two funds maintained separately, under fixed trust agreements providing safeguards peculiar to the special needs of the makers.

Smaller Industries Hold First Conference on Management Problems

TENTATIVE plans for the formation of a permanent organization to foster discussion of the problems of the small manufacturer were the chief outcome of the first conference on management problems of the smaller industries held at Silver Bay, N. Y., Aug. 10 to 15, under the auspices of the Silver Bay Association.

The conference program covered a wide range of subjects, including stabilization of employment, budgeting, production costs, personnel and safety work, sales problems, scientific management and advertising. An address by Gov. Franklin D. Roosevelt of New York at a special session was an outstanding feature. Seldom have conferences been characterized by such enthusiasm and intense earnestness on the part of all the delegates as prevailed at the Silver Bay meeting, this spirit auguring well for future gatherings.

Pointing out that the smaller industries employ more than half of the nation's industrial labor, President Hoover, in a message read at the opening session, praised the purposes of the conference and declared that "business stability will be built not only on the foundations of the individual efficiency of industrial units, large and small, but upon their united efforts in analyzing their common problems and their cooperation in a sound program."

The backbone of American industry lies in the large number of smaller establishments scattered throughout the country, said Dr. Julius Klein, sending a message as Acting Secretary of Commerce. He observed that the growth of industries in size does not necessarily mean increased efficiency, emphasizing that many smaller industrial companies are producing and marketing commodities "at a distinct advantage over their larger competitors." He said that there is and always will be a distinct place in American business for medium-sized and small industrial and mercantile organizations.

Manufacturers are now attempting to maintain the principle of self-regulation of business through properly organized, efficiently operated, adequately financed and well supported trade associations, declared Philip P. Gott, manager of the trade association department of the United States Chamber of Commerce, Washington, D. C. Through the elimination of uneconomic practices, through elimination of business losses and through development of aids to management, the trade association has become a vital force for the welfare of industry. The manufacturer in smaller industries has an opportunity through his trade association to work out plans which will aid in eliminating or reducing the peaks and valleys of business cycles.

Elasticity Is Trump Card of Small Industry

America owes more to, expects more from and will receive more from the small manufacturer than the large if smaller companies will take the lead which belongs to them, asserted J. P. Jordan, senior partner in the firm of Stevenson, Jordan & Harrison, New York, management engineers. He declared that large corporations are too unelastic, too fixed in their habits and that, insofar as they can, many of them are finding it profitable to return to small plant methods. Mergers generally are not making good from the standpoint of profits and results. He emphasized that profit-sharing is the last thing to be considered by a company, except for the few top executives on whom chief responsibility rests. On the other hand, bonuses should be paid in individual departments for savings made, whether the company as a whole is making a profit or not.

Mr. Jordan expressed strong opposition to filling up a shop with low-priced work, a policy which leads only to chaos, and advocated the setting of standards throughout a plant as a basic necessity in attaining production efficiency. He declared that test runs are the most pernicious practice in industry today, because they fail to take into account the element of human nature which strives at such times to secure extraordinary results which cannot be maintained from day to day.

Our "Pro-Trust" Laws

That our national anti-trust laws have become pro-trust laws because they are forcing the smaller industrial and big business organizations into mergers or out of business, thus concentrating the bargaining power in the hands of the big units, was the declaration of Virgil Jordan, economist of *Business Week*, New York, who asserted that present tendencies indicate the need for modification of our anti-trust policies so as to permit cooperative efforts toward control of production and stabilization of prices in the public interest. He said that smaller industries succumb more easily than larger ones to the pressure of deflation and are likely to adjust themselves to it by prompt wage and price cutting. Because of their importance in total employment as well as in the marginal markets for products, they thus tend to speed up and intensify deflation. This fact is largely the result of their backwardness in dealing with obsolescence of equipment, in cost accounting and in scientific control of wage costs, and of the weaknesses of trade cooperation. Insofar as the smaller industries overcome these deficiencies, they may become a powerful influence in softening the extreme effects of deflation on wages and prices.

When business men generally recognize that facts are the records of the past and that in order to attempt prophecies of the future one must know the past, industrial statistics will come into general use, said R. G. Anderson, Robinson-Bynon Shoe Co., Auburn, N. Y. So long as statistics are looked upon as meaningless figures and statisticians as seers and prophets, not much will be accomplished. The most desirable thing is to make every business executive, big and small, his own forecaster, at least so far as his own business is concerned. We have too many prepared opinions and not enough intelligent interpretation of the facts.

Forecasts State Unemployment Insurance

Not only have American employers failed to make notable progress in the direction of stabilizing employment, but fluctuations in employment are wider, the percentage of unemployment is vastly greater, and there is less concern for the economic, social and political consequences of unemployment in the United States than any other industrialized country of the world, said Dr. Royal Meeker, former United States Commissioner of Labor Statistics and now associated with Prof. Irving Fisher of Yale University, New Haven, Conn. He further declared that the net result of the "stabilizing plans" of some of the country's industrial establishments "is the zero with the rim rubbed out, the center punched out and a minus sign before it."

He told the conference that unemployment cannot be taken care of in this country without compulsory legislation by the States and the nation, nor can the solution of unemployment ever be effective without the full cooperation of all employers' and workers' organizations. In times of what

may be called normal business recession the individual plant management can do a great deal to bring about stability in production and employment in an individual plant. It has also been demonstrated that in times of deep and general depression, individual plant programs for stabilization are of little avail.

The economic advantages of accident prevention apply to small as well as large plants, declared H. W. Heinrich, assistant superintendent of the engineering and inspection division, Travelers' Insurance Co., Hartford, Conn. The small plant owner pays the same rate for workmen's compensation insurance as the large plant in a given classification and the cost of the insurance increases or decreases as the cost of accidents in the classification increases or decreases.

C. C. Winegardner, personnel manager, Diamond Chain & Mfg. Co., Indianapolis, described the personnel program at the Diamond plant, which employs an average of 500 workers. A. N. Goddard, president Goddard & Goddard Co., Inc., Detroit, addressed the delegates on the subject of "Creating Conditions Conducive to Efficient Operation," while Powers Hapgood told about the experiment being made in cooperative ownership and management by employees of the Columbia Conserve Co., Indianapolis.

Health Program in Small Plant

Dr. Glenn S. Everts, medical secretary of the Philadelphia Health Council and Tuberculosis Committee, Philadelphia, outlined a practical medical and health program for the small plant. This should include an annual physical examination of all employees (the keystone of all health work), periodic follow-up examination of those employees having correctible defects, care of minor illnesses while employees are at work, advice regarding chronic illness of employees with proper reference to the employees' own physician, initial care of all minor accidents and redressings in plant dispensary, and emergency treatment of serious accidents in the plant. The program likewise should provide for first aid instruction of selected employees, annual sanitary survey of the plant, routine sanitary supervision of the plant, health education by means of talks to employees, liberal use of posters, occasional presentation of motion pictures and doctor-to-patient talks. The cost to an industrial plant of nurses' and physicians' time while service is maintained by the Philadelphia Health Council is $4.50 per employee per year, payable monthly. Installation of a two-room dispensary with initial supply of items costs $200 to $400.

A large measure of the conference's success was due to the efforts of Harold F. Browne, manager industrial relations department, National Industrial Conference Board, New York, who was chairman of the committee in charge of arrangements.

Some Steel Companies Oppose Advance in Freight Rates

Jones & Laughlin and Youngstown Mills Appear Before Interstate Commerce Commission to Protest

WASHINGTON, Aug. 18.—Vigorous protests from two important sources against increased freight rates on incoming raw materials used by the steel industry and on its outbound manufactured products were made here yesterday before the Interstate Commerce Commission at hearings relating to the proposal of the railroads to make a general 15 per cent advance.

The first witness of the day, F. A. Ogden, traffic manager of the Jones & Laughlin Steel Corpn., Pittsburgh, not only objected to an increase in rates, but suggested that rates be reduced, which, he declared, had been done in the past in times of depression. He protested particularly against increased rates on iron ore and on manufactured products.

Mr. Ogden contended that interior points, such as Pittsburgh, are already at a disadvantage when compared with Lake front plants, and that they would be further handicapped by an increase in rates. High freight rates were given as the reason for Pennsylvania losing its rank as a point of production. He declared also that United States Steel Corpn. ore-carrying railroads already show high returns in revenue and that to give them greater freight rates would further accrue to their interest to the disadvantage of industrial plants operated by independents.

Youngstown Interests Protest

J. V. McMahon, traffic manager of the Youngstown Chamber of Commerce, immediately followed Mr. Ogden on the stand, and said that present rates on raw and finished materials to and from the Youngstown district would make it almost impossible for that district to meet competition with steel industries located on rivers and the Great Lakes, where they have the benefit of water transportation. Like Mr. Ogden, it was predicted by Mr. McMahon that increased rates on these products would divert traffic to other forms of transportation and thus deprive the railroads of revenue. Mr. McMahon said that "assuming that the Youngstown district industries could continue to compete with industries on waterways," higher freight rates would mean an estimated annual cost of $3,945,609 additional on inbound raw materials, exclusive of the important item of scrap, entering Youngstown.

The testimony of Mr. Ogden and Mr. McMahon was the first to be presented from any section of the steel industry against the proposed increased rates and for that reason created unusual interest.

Says Rise Would Penalize Industry

"To further penalize the industries for the benefit of the railroads is to divert more and more the business, how little it may be, to trucks and other forms of transportation and to greatly hamper all the industries," Mr. Ogden said. "If the industries are not helped there will be very little business for the railroads or any other means of transportation, and freight rates will be of no avail."

The iron ore freight rates, it was stated, should be left without increase at this time because they already pay the carriers more than a reasonable return for the service performed. Mr. Ogden pointed out that the Duluth, Missabe & Northern Railroad handles approximately one-half the total tonnage moving to Lake Superior ports and that 95 per cent of the total tonnage is iron ore. In the past two years, he said, that railroad has paid 100 per cent dividends, or $100 a share, on its capital stock, and, according to its annual report to the commission, Mr. Ogden stated, has earned 15 per cent on its book value in 1929 and 11 per cent in 1930. This road and the Lake Superior & Ishpeming Railroad, together with the Great Northern, it was stated, haul over four-fifths of the iron ore from mines to upper Lake ports.

Would Aggravate Competition

In opposing increased rates on manufactured iron and steel, Mr. Ogden said that Jones & Laughlin now pays substantially $1,000,000 a year in equalization in order to sell in competitive markets against producers that have lower rates.

To advance the rates on iron and steel a flat 15 per cent, Mr. Ogden said, would nullify the mileage rates established in the general (Hoch-Smith) rate case and also discriminate among the different steel manufacturing companies. The rate to any point from Pittsburgh, it was stated, where the rate would be 35c. based on mileage as to New York, the advance would be $1 a ton. The advance from Bethlehem to New York, it was stated, would be 2½c., thus increasing the relationship from a 17½c. differential, as at present, to 20c. under the proposed advance, or 50c. a ton greater handicap to Pittsburgh than now exists. This was said to be true of all points according to the freight rates now existing and what they will be if a 15 per cent advance is granted.

Method for Spinning Rustless Steel Alloys

By M. J. R. MORRIS
Metallurgical Engineer,
Republic Steel Corpn.

STANDARD practices in handling the stainless alloys have been evolved to cover almost every field of fabrication but spinning was thought by many fabricators to present an almost insurmountable problem. Only comparatively recently has the proper procedure been worked out. However, such parts as large coffee urn tops are now being spun successfully from Enduro KA2 in one operation without resorting to an intermediate anneal.

The chrome-nickel type, of the 18-8 analysis such as Enduro KA2, is preferable to the straight chrome grades of stainless for spinning operations. Its greater ductility necessitates less annealing when spinning deformations are severe. Because of the tendency of the 18-8 alloys to harden upon cold working, considerable power is required to spin. The blank frequently will show a tendency to wrinkle or break along the edges. This can be avoided by staying about 1 in. back from the edge until the operation is nearly finished, saving the edge until the last.

Annealing, when required, should be done at a temperature of 2000 to 2050 deg. F., followed by rapid cooling either in air or water. The annealing time should be very short. Three to five minutes is all the time ordinarily required for light-gage spun parts.

Experience has demonstrated that cast iron tools are quite successful in spinning Enduro KA2. A nickel-chromium cast iron, heat treated to maximum hardness, is superior to ordinary cast iron for this purpose. The analysis should be approximately as follows:

	Per Cent
Carbon	3.00
Nickel	2.50 to 3.00
Chromium	0.75 to 1.00
Silicon	1.20 to 1.50

Water-soluble lubricants are recommended, particularly where intermediate annealing is required, as the lubricant must be entirely removed before the article is placed in the annealing furnace. Soap has proved very efficient as a lubricant in spinning Enduro KA2. Some jobs which represent a combination of drawing and spinning will require special annealing operations which cannot be covered in general instructions of this kind but will require individual study.

If the straight chromium grades of stainless are to be spun, or the lower chromium containing some carbon, the foregoing instructions will apply in general, except that annealing temperature should be held to 1400 to 1550 deg. F., followed by air or furnace cooling.

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Rail Terminal Services Subject of Inquiry

WASHINGTON, Aug. 18.—The Interstate Commerce Commission last Saturday sent out notices to Class I railroads of information that will be asked of them regarding the general inquiry the commission has instituted in connection with railroad management, together with dates and places for the hearings. These hearings will deal with terminal services.

The notices require that the carriers have the necessary officers present to reply to the queries, which will cover all phases of terminal services in the receipt and delivery of carload and less-than-carload freight, including the switching and spotting of cars, loading, unloading, storage, elevation, reconsignment and all other services and privileges, except transit and lighterage. Information will be sought as to the applicable charges, if any, established for such services; the extent to which the line-haul rates include charges for such services; allowances and absorptions made out of the line-haul rates; the extent to which such services reach beyond the carriers' terminals to particular locations on private track sidings, industrial plant tracks and on the railroads of industrial common carriers; the detention of cars at the terminals and the extent and particulars in which the private industrial railroads and industrial common carriers are used at the carriers' expense.

The principal basis or source from which the inquiry will proceed will be the industrial directories and the industries they list. The commission informed the carriers that a sufficient response will be made by describing and defining typical examples, separately in reference to each railroad and each class of services rendered at the larger terminals and industrial centers. Provision was made, however, that where practical an informed officer or officers may make general response for all carriers in circumstances where, relating to particular services and the industries served, the nature of the services and governing practice are identical or generally the same. The commission cited as an example the spotting of cars without charge in addition to the line-haul rate on ordinary private sidings or spurs as distinguished from like services on systems of private industrial plant tracks or through industrial common carriers.

The hearings will be in charge of Director W. P. Bartel of the Bureau of Service and Examiner C. M. Bardwell and will begin on Sept. 15 at Boston, lasting five days in that city.

Other hearings have been scheduled as follows: New York, Sept 22 to Sept. 30, Merchants' Association rooms, 233 Broadway, New York; Oct. 5 to Oct. 17, Chamber of Commerce rooms, Pittsburgh; Oct. 20 to Oct. 23, Hotel Buffalo, Buffalo; Oct. 26 to Oct. 30, Hotel Statler, Detroit; Nov. 2 to Nov. 7, Hotel Gibson, Cincinnati; Nov. 10 to Nov. 24, Sherman Hotel, Chicago.

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Scrap Rates Reduced in Three Decisions

WASHINGTON, Aug. 18.—Reduced rates on scrap iron and steel will become effective on Nov. 9 as the result of three decisions made public last Saturday by the Interstate Commerce Commission covering movements from points in Virginia, West Virginia and North Carolina.

Passing upon a complaint by the Lynchburg Iron & Metal Co., the commission ordered the rate of $3.20 per net ton from Reidsville, N. C., to Lynchburg, Va., reduced to $2.19; the rate of $3.30 from Spray, N. C., to Lynchburg reduced to $2.22, and the rate of $4.15 from Spray to East Radford, Va., reduced to $2.64. The rates are subject to a minimum carload of 40,000 lb.

Rates charged from Danville, Va., to Ashland, Ky., and from various points on the Chesapeake & Ohio Railroad in Virginia and West Virginia to Ashland, Staunton, Va., and New Boston and Portsmouth, Ohio, were held not unreasonable in the past but unreasonable for the future. From Danville to Ashland, the commission prescribed a rate of $5.37 per gross ton, reduced from $6.31. From points on the main line of the Chesapeake & Ohio in West Virginia to Staunton; from Staunton to Ashland, New Boston and Portsmouth, and from Lynchburg, Va., and main line points between Cabin Creek Junction, W. Va., and Lynchburg, to Ashland and Portsmouth, the commission prescribed rates based on 70 per cent of the basic scale of rates established in the so-called general iron and steel (Hoch-Smith) case. Rates from branch line points were fixed on a scale calling for 2½c. per 100 lb. for 10 miles and under up to 7½c. for over 100 miles. The complainant in this was Klotz Brothers, Staunton, Va.

Rates from Huntington, Va., to Portsmouth and New Boston were also established on the basis of 70 per cent of the scale in the general iron and steel case. The rate charged was $1.89 per gross ton.

Motor Industry Watching Next Move of Ford with Keen Interest

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DETROIT, Aug. 17.

THE automobile industry is still in the midst of the summer vacation season, and production therefore continues at a comparatively low point. There are signs of a contraction of activities at various Chevrolet plants, although it is understood that no new models will be offered publicly until at least November, which was the month last year that the present series was introduced. Plymouth accounts for a good portion of output at the moment.

Detroit is awaiting with interest the next move by the Ford Motor Co. The conviction is deepening that any changes which will be made in model A will not be of a radical nature, but, of course, this is only speculation. The Ford people keep their secrets better than anybody in the industry and there probably isn't anyone in Detroit who actually knows what Mr. Ford intends to do. Meanwhile, the Rouge works continues to employ more than 45,000 men. The steel plant as well as many departments are said to be idle, and the steel trade is hoping that before the end of the month Ford will purchase some steel for September delivery.

1932 Models Under Consideration

Many manufacturers are turning their attention to preparations for 1932 models, although little, if any, new offerings are anticipated for at least 60 days. It is notable that, in getting ready for next year's production, few machine tools have been ordered and new equipment buying for this purpose is expected to remain at a low level.

July was the fourth consecutive month in which General Motors' sales to dealers were larger than in the corresponding months of 1930, and the second consecutive month in which sales to consumers were larger. Sales to domestic consumers totaled 85,054 units, against 103,303 in June and 80,147 in July last year, exceeding sales to dealers by 6331 units. For the entire year through July, sales to consumers were 678,618 cars, and sales to dealers 704,397. Total sales to dealers in the United States and Canada, plus overseas shipments, were 811,646 cars, compared with 844,195 in the same months of 1930.

Based on wholesale factory prices, average price of an automobile in 1930 was $568.36, against $621.75 in 1929, $671.42 in 1928 and $756.85 in 1927. A further reduction is expected this year and probably another drop in 1932.

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Automobile retail sales are suffering from seasonal slump as well as from the depression. Retail dealers' stocks are low, averaging only two to three cars a dealer.

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Sharp reduction in production costs ordered by General Motors and other companies in making 1932 models. Notable absence of purchases of new equipment in preparing for next year's offerings.

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Both Packard and Hudson are offering as optional equipment at an extra cost of $15 an automatic device which starts the motor when the ignition is turned on. The device does away with the necessity for using the conventional starting pedal in the floor or a starting button on the dash. The ignition key acts also as a switch to operate the electric starting motor. As long as the key remains turned on, the starting motor will operate at any time the engine stalls. As soon as the engine starts, the starting motor automatically is thrown out of gear and stops.

A new copper-cooled valve for automobiles and trucks is being introduced by a local parts manufacturer. It is said to give automobiles the cool performance of the expensive airplane-type valves. The new valve has copper forged into the head and stem, which acts as a heat conductor, carrying the heat away from the valve head.

Seek Savings in Production Costs

There has been considerable discussion lately of the trend of retail automobile prices next year. Some manufacturers have publicly expressed the opinion that an increase must come if the industry if to earn an adequate return on its investment; on the other hand, it is freely acknowledged that the public is not in the buying mood and that a boost in prices would only add to an already keen sales resistance. Based on wholesale factory prices, the average price of an automobile in 1930 was $568.36, against $621.75 in the previous year, $671.42 in 1928 and $756.85 in 1927. With prices down this year compared with last, it is safe to say that the 1931 average will show a further decline, and there is a strong possibility that this downward trend will not halt in 1932.

It is understood that the management of General Motors has asked all manufacturing subsidiaries to make further savings in production costs on 1932 models. This may be passed along, in part, to the public in the form of lower retail prices, or it may be reflected only in the motorist's get-

ting more for his money without actually paying less for his car. The equipment people point out that General Motors companies already have resorted to drastic production economies and that if they go one step further they will be driven to the purchase of new, cost-saving machine tools and other equipment. Equipment salesmen, therefore, are devoting much attention just now to General Motors, believing that its production executives must spend in order to save, paradoxical as that sounds.

"All-Aluminum" Truck in Market

Fageol Motors, which has pioneered in the building of aluminum truck bodies, has put on the market an "all-aluminum" truck in which all parts which lend themselves to production in aluminum alloy are made of that material. These parts include the axle housing, radius rods, frame rails, main frame members, fenders, hood panels, floor boards and running boards. All joints between aluminum members are made by means of heat-treated bolts rather than rivets, and all steel-to-aluminum joints are protected against corrosion by bituminous paint. Safety factors were calculated from actual tests of steel and malleable members; in order to assure equal factors of safety with aluminum alloy, it was necessary to increase the sections an average of 50 per cent. The design of the truck is based on a previous model in which most parts now made in aluminum alloy were made of steel. In working out the design of aluminum alloy parts, the Fageol company had the assistance of the Aluminum Co. of America.

The Ford Motor Co. is now making high-compression cylinder heads and installing them on new cars on special order. About 20 per cent of model A cars are said to be equipped with this feature, which permits greater acceleration and higher top speed. Skinner Motors, Inc., has under development a sliding valve motor with four cylinders, having a displacement of 183 cu. in.

Now that automobile retail sales are suffering from seasonal factors as well as from the depression, manufacturers are watching carefully against stocking dealers too heavily. A good illustration is the experience of the Auburn Automobile Co., which reports that dealer inventories average only two cars each. A large truck company at present is making trucks only after the customer has placed an order with the dealer.

General Motors made an enviable record during the first half of 1931. Cadillac, Buick and Pontiac were ahead of their sales for the same months of 1930. Although Chevrolet missed its 1930 figure by a narrow margin, it passed its chief competitor in passenger car sales by more than 18,000 cars. The detailed sales record is: Cadillac, 6800 against 5500 last year; Buick, 54,000 against 52,000; Pontiac, 47,000 against 45,000; and Chevrolet, 368,000 against 391,000.

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A.S.T.M. Metallography Program Outlined

The committee on metallography E-4, American Society for Testing Materials, through Chairman C. H. Davis, assistant metallurgist, American Brass Co., has summarized the major projects now under way in the field covered by this committee.

Subcommittee IV on photography is making a thorough study of lens combinations in order that definite recommendations may be offered and ultimately published under a revision of "Standard Rules Governing the Preparation of Micrographs of Metals and alloys," E2-30. Considerable progress has already been made by this committee. This study will include the definition of the word "macrograph," as there is a feeling that this term should include magnifications up to 20 or 25 diameters.

A special committee on grain characteristics of steel was organized after the March, 1931, Pittsburgh committee meeting. The first thought was to study grain sizes of steel, but as a result of a discussion during the annual meeting of the society in Chicago, it was decided to enlarge the scope of the committee's work to include the spheroidizing of tool steels, a work which was initiated in 1929. H. A. Anderson, Western Electric Co., who had been in charge of the work on spheroidizing, proposed that his efforts be joined with those of the committee on grain sizes. The combined committees, therefore, were given a new name, "Special Committee on Grain Characteristics of Steel."

In a general way the outline of procedure includes the preparation of grain size charts for carburizing steels, for forging steels and then for tool steels. Possibly sheet steels will be included at a later date. Much interest is being shown in the projects outlined by this new special committee and it is felt that the results of their work will be of particular interest to the users of steel.

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Colorado Fuel to Run Iron Mines and Furnace

DENVER, Aug. 15.—The Colorado Fuel & Iron Co. will continue to operate a blast furnace at its plant at Pueblo, regardless of the fact that there is no demand for the output at present. According to Arthur Roeder, president, the move is made to help alleviate the unemployment situation in this territory. As a result of the continuance of the blast furnace, iron ore mines of the company will reopen, as will limestone quarries and coal mines, and will give employment to more than 1000 men. "We do not need the iron at the moment," said Mr. Roeder, "and the blast furnace at Pueblo ordinarily would be closed down, but we want to aid the employment situation as much as possible. Besides, we believe there is a good chance for a fall pick-up in business for the company."

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STEEL FINDS ANOTHER USE

Sanitary and efficient collection of refuse is made possible by a new machine, designed by A. R. von Keller. The refuse is loaded into the rear and is packed toward the front of the steel tank as it slowly rotates.

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PERSONALS

C. A. MACFIE, heretofore manager of merchandise sales in the new York district for Revere Copper & Brass, Inc., New York, has been made assistant sales manager, with headquarters at 230 Park Avenue, New York. He has been in the copper and brass business since 1912, starting with the U. T. Hungerford Brass & Copper Co. Later he became connected with the Rome Brass & Copper Co., now known as the Rome Division of the Revere company.

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E. D. KASER, formerly secretary and treasurer of the Durabilt Steel Locker Co., Aurora, Ill., has been elected president and general manager, succeeding C. W. KILLIAN, who has resigned because of ill health. V. C. KASER has been made vice-president of the company and H. S. HATCH, treasurer and manager of sales. D. V. TRAPP has been appointed purchasing agent, succeeding E. V. PAULY, who has resigned. W. H. GRAHAM has been made secretary.

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ROY J. WENSLEY, creator of the Televox, first of the popular mechanical robots, has been transferred from the engineering department of the Westinghouse Electric & Mfg. Co., East Pittsburgh, to the meter department at the company's Newark, N. J., works. He has been with the Westinghouse organization since 1916 and was prominently identified with electric refrigerator development.

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JOHN J. STANTON, merchandise manager in the Northwest district for the Westinghouse Electric & Mfg. Co., East Pittsburgh, has been appointed Milwaukee manager for the company and, in his new capacity, will have charge of Wisconsin and upper peninsula of Michigan. Mr. Stanton has been with the Westinghouse organization since 1915, and was made merchandise manager in 1926.

FRANK W. JONES, formerly of the Eastern Steel Co., who was recently elected vice-president, general manager and a director of the Hanover Wire Cloth Co., Hanover, Pa.

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"Dismissal Wage" Studied by Conference Board

The "dismissal wage" is the most recent of the many plans for alleviating some of the more distressing conditions surrounding enforced unemployment. Although it is of so recent origin as to have attained but a limited application in this country, the National Industrial Conference Board, recognizing the importance of the principle involved, has made a survey of the subject and will shortly issue a report.

No serious attempt has been made thus far in the United States to make the payment of a dismissal wage compulsory, but in some of the other countries such legislation has been enacted, states the Conference Board. In Austria, after the World War, certain provisions were put into effect governing the discharge of workers. These provisions, however, were found to be so stringent as to render the discharge of an employee almost impossible and they were later abandoned. In Mexico workers discharged through no fault of their own are allowed three months' pay; in Ecuador dismissed employees with more than one year's service are entitled to two months' pay; in Bolivia the allowance is graduated from one month's pay for less than one year's service to 25 months' pay for 25 years' service or more.

Voluntary dismissal wage plans are still few in number in the United States. In an analysis of industrial relations activities recently made by the Conference Board, it was found that of 2618 companies only 53, or 2 per cent of the total, were paying dismissal wages under formal plans. In addition, 30 companies made a practice of paying dismissal allowances in special cases. The 53 companies comprised all sizes, from those employing over 20,000 workers to plants employing less than 250.

A recent demonstration of the dismissal wage was furnished by a large industrial corporation. A concentration of departments made it necessary to close permanently two plants in New England. In addition to giving the employees a month's notice of the closing of the plants, the company paid dismissal wages totaling hundreds of thousands of dollars. The plan provided that all employees with 15 or more years of service should receive one week's pay for each year of service, and similar provision was made for employees 45 years of age or older with 10 years or more of service. Actual dismissal wages paid to employees of these plants ranged from $104.61 to $2,088, the average payment being approximately $500. About one out of every eight employees qualified for a dismissal wage.

The practical result of this action, as revealed by an investigation after the plants were closed, was that instead of turning from their doors 2000 people with a grievance, bitter and ready to listen sympathetically to radical doctrine, this company by its liberal policy justified in the eyes of its former employees and those who came into contact with them not only the particular management, but the economic system under which it operated.

"It is recognized," states the report in conclusion, "that if industrial management refuses or fails to provide a constructive solution at least for the more pressing social problems that affect its employees, it may expect the decision to be taken out of its hands on matters that it should determine. State legislatures are showing each year a growing inclination to take an active part in dealing with these matters. The main drawback to adopting a dismissal wage policy is the uncertainty with regard to the expense it may involve at some time in the future. Against the cost may be set its salutary effect on employment and utilization of labor, its undoubted benefit to displaced workers, and its contribution toward social stability."

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Members of the Electric Hoist Manufacturers' Association report that the number of hoists ordered during July decreased 10.19 per cent, compared with the previous month, and the value of such orders decreased 20.4 per cent. Shipments were 16.9 per cent greater in July than in June.

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Verner Iron & Steel Co. has been incorporated in Illinois and will operate with headquarters in Chicago as a brokerage firm in raw materials. F. L. Verner, president, was formerly purchasing agent for the Interstate Iron & Steel Co., now part of the Republic Steel Corpn.

OBITUARY

FREDERICK REES PHILLIPS, of Phillips Brothers, Philadelphia, and a director of the Perry-Buxton-Doane Co., Boston, died accidentally on Aug. 15, of carbon-monoxide gas poisoning. He was 53 years of age and well known in eastern Pennsylvania through his connection with Phillips Brothers, importers and exporters of iron and steel, and his former connection with the Perry-Buxton-Doane Co. as district representative for about 10 years. During this period he was secretary of that company and later vice-president. Four years ago he severed his connection to devote his entire time to F. R. Phillips & Sons Co., which was recently reorganized as Phillips Brothers. In the past year he had interested himself in the insurance business, and in the past month had been elected a director of the Perry-Buxton-Doane Co., succeeding his brother W. Vernon Phillips, who died July 2.

F. R. PHILLIPS

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HUGH W. WILLIAMS, founder and president for 33 years of the Drake-Williams-Mount Co., Omaha, Neb., tank and boiler manufacturer, died Aug. 3. Mr. Williams moved to Omaha 46 years ago from Milwaukee, where he was born.

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HENRY W. ZIMMERMANN, president, Atlas Engineering Co., Milwaukee and Clintonville, Wis., manufacturer of conveyors, concrete mixers, car unloaders and other equipment, died Aug. 9, aged 72 years. He was born in Milwaukee and lived there all his life, excepting while representing the International Harvester Co. in Germany and Russia from 1907 to 1915. He founded the Atlas company on his return. An only son, Chester W. Zimmermann, general manager of the company, has been traveling in Europe for several months and was reached with news of his father's death while in Russia.

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BRUCE FORD, vice-president and director of the Electric Storage Battery Co., Philadelphia, and until recently general manager of the company, died after a brief illness at his home in Philadelphia on Aug. 10, aged 58 years. He was a graduate of Brooklyn Polytechnic Institute and had been employed at one time as draftsman, shop foreman and engineer of the Johnson Co. and Lorain Steel Co. Mr. Ford had been identified with the Battery company since 1898 and was the holder of more than 50 patents owned by the company.

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CHARLES PHELAN, president, American Asphalt Paint Co., Chicago, was fatally injured in an automobile accident Aug. 13 while en route to Glacier National Park. Mr. Phelan died without regaining consciousness. He was 51 years old.

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WILLIAM S. HALL, president, Eagle Iron Works, Minneapolis, died Aug. 7, aged 87 years. He was born at Bury, England, and came to the United States in 1868, locating in Philadelphia. He moved to Hudson, Wis., and in 1878 moved to Minneapolis to establish the iron works which he headed at the time of his death.

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JAMES G. MUSTIN, formerly well known steel plant superintendent in the Pittsburgh district, died at his home in Cleveland, Aug. 7, aged 82 years. Mr. Mustin was in the employ of the American Steel & Wire Co. nearly 40 years. He started in 1881 as a shipping clerk at the South Side plant in Pittsburgh. He worked his way up to become a mill superintendent in 1899 and served in that capacity in the Rankin, Allentown and Braddock plants of the American Steel & Wire Co. For several years before his retirement in 1920 he was connected with the company's educational bureau engaged in instruction work at its various mills.

Reinforcing Steel Trade Adopts Business Rules

WASHINGTON, Aug. 18.—The Federal Trade Commission today announced approval of trade practice conference rules for the reinforcing steel fabricating and distributing industry.

The rules follow a conference held in Asheville, N. C., in April, 1929, and have been accepted by the industry. They were partially reworded by the commission before being approved. The new code consists of six group one rules and seven group two rules. The commission declined to approve or accept six rules which were proposed as expressions of the industry.

The approved rules designated as Group One cover practices held to be violations of the law and pertain to the following subjects: Inducing Breach of Contract; False Branding; Deceptive Advertising; Secret Payment of Rebates; Discrimination in price between different purchasers of commodities, and directly or indirectly giving money or anything of value to agents of customers or representatives of competitors' customers without the knowledge of their employers or principals.

The Group Two rules approved and which are accepted as expressions of the trade relate to such subjects as Definition of the Reinforcing Steel Fabricating and Distributing Industry; Independent Publication of Price Lists; Arbitration; Standard Form of Contract; Accurate Methods for Determining Costs; Making the Terms of Sale a Part of Published Price Schedules, and a Committee on Trade Practices.

Metal Production in Canada in 1930

No hematite, magnetite or other iron ores used in making pig iron or steel were mined in Canada in 1930, according to the Dominion Bureau of Statistics, Ottawa. Production of titaniferous iron ore or ilmenite amounted to 412 tons, compared with 2748 tons in 1929. This ore, which was exported to titanium consumers in the United States, was valued at $1,239 in 1930, against $7,359 the preceding year.

Shipments of hematite iron ore from the Wabana mines in Newfoundland totaled 1,319,316 tons, valued at $3,200,569. This averaged 51.5 per cent Fe. Canada absorbed 523,918 tons of the total. The United States was the recipient of 54,623 tons, while 740,774 tons went to Germany.

Manganese ore produced in Canada in 1930 amounted to 273 tons, valued at $1,356. Imports of manganese oxide were 98,777 tons, compared with 99,139 tons in 1929. The value in each year was a little over $990,000.

No molybdenite was produced in Canada in 1930, but in 1929 production was 16,150 lb., all in the Province of Quebec. No tungsten was produced in Canada in 1930.

Unfilled Tonnage Off Less Than Output

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

IF we retain as a base the old rising "trend" lines which applied down to 1929, we get the following measurements of average daily production in July: Steel ingot output 48.1 per cent of normal; pig iron output 50.1 per cent of normal.

The figures indicate that steel production declined over 9 per cent although the usual seasonal decline in July is only a little over 3 per cent. Therefore, production was off about 7 per cent more than usual. Pig iron production in July declined over 13 per cent, although the usual decline is only a little over 4 per cent, so that the actual decline was 9 per cent more than usual.

At 48.1 per cent of normal, the ingot output compares with 52.1 per cent last December, and represents the lowest annual rate of production since September, 1921. At 50.1 per cent of normal, the pig iron production compares with 57.3 per cent last December and is the lowest annual rate since November, 1921.

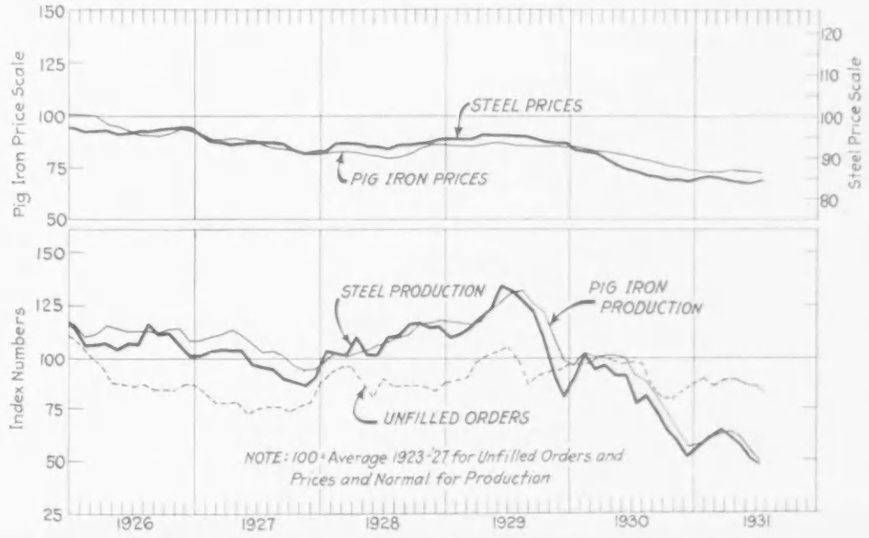
Pig iron production is more nearly in line with steel production than it has been in any month since last March, but is still above average with relation to the latter. This usually means accumulating stocks of pig iron. Steel ingot production, in turn, is above the indicated requirements of the chief consuming industries (as measured by our composite demand line) and that usually means the necessity for further curtailment.

Some light on the situation is thrown by the unfilled orders of the Steel Corporation. Usually such orders increase more than 2 per cent in July, but last month they decreased 2.2 per cent. Accordingly, the seasonally adjusted index, taking the average for 1923-27 as a base, becomes 82.5 per cent, against 86.3 per cent at the end of June. This is the lowest level since last October. It compares with 90.1 per cent in January, and the trend has clearly been downward since April. The extremely low volume of the steel business is thus apparent, since, with production at only 44.8 per cent of "normal" and receding, the unfilled orders could decline only if new business were extremely low. Perhaps, however, there is some encouragement in the fact that while the adjusted production index declined about 7 per cent the adjusted unfilled orders index declined only 4.4 per cent.

As to a possibility of a turn in steel production, we find no definite and positive indications, but must resort to such reasoning as the following: The weekly percentage-of-capacity figures and general business data do not indicate as yet a gain in August steel production. But normal seasonal variation calls for some increase in August. Moreover, the recoveries of 1921 and 1924 both came in August. To date, however, definite signs of a real cyclical recovery in production with the beginning of the fall season are still lacking.

The price situation appears to remain in an unsettled and transitional condition. As bearing on the scrap market, we note that the demand for steel is so dull that a sustained rise in scrap prices is hardly probable. Moreover, although steel scrap has been relatively cheap in comparison with pig iron, this condition is now changing. A little further seasonal firmness may be expected, but a general upward trend in the scrap market does not seem likely.

Pig iron production being still high in comparison with steel production, it does not seem that we can expect strength in pig iron prices. From the statistics, we are justified in inferring that pig iron piles are still too high. Moreover, pig iron production is still declining and rarely, if ever, do we find a substantial recovery in prices until after the adjusted production curve has turned upward.



BOTH pig iron production and steel output declined more than seasonally in July. Unfilled orders of the Steel Corporation receded whereas they usually increase in the seventh month of the year. However, the drop in unfilled tonnage (seasonally adjusted) was less than the falling off in steel production.

W. W. MACON
Editor

THE IRON AGE

A. I. FINDLEY
Editor Emeritus

(ESTABLISHED 1855)

Doles and Taxes

IN all probability the next session of Congress will be the occasion for many raids, or attempts to raid, upon the national treasury. More bonuses for ex-soldiers, donations to wheat-growers, compensation for losses by drought and grasshoppers will be advanced. There is even the terrifying specter of a dole to all unemployed persons.

The whole idea of tapping the national treasury is based on the fallacy that it contains great liquid wealth that may be drawn off for the relief of the needy and unfortunate. The national treasury possesses no liquid wealth and no money beyond the requirements for paying current bills, in respect to which it ended the last fiscal year with a deficit. The national treasury does, however, possess credit, i. e., the ability to borrow.

Any borrowing has to be repaid. The method of providing for repayment is by taxing all the people. Taxation comes therefore out of the future earnings of the people. It cannot come out of past earnings, for they have been converted into houses, land, improvement, factories and other physical forms of wealth.

An individual may sell his house and convert the proceeds into gold and use some of the latter for payment of tax bills, but all the people could not sell all their houses and convert the proceeds into gold. There is not anywhere near gold enough in the whole world.

When Congress makes extravagant appropriations it mortgages our national future and while perhaps temporarily relieving the needs of a few of the people it multiplies distress later on. The unexpected prolongation of the present depression is undoubtedly associated with the bad things that politicians have been doing in trying to cure it.

More and more does it become evident that the present depression is associated with social fallacies rather than with economic misadventure, or miscalculation, or with the capitalistic system. There is no use, therefore, in trying to forecast the future from the past. The advice of the philosophers and psychologists is now better than that of the economists.

Reverting to the subject of taxes, the people ought to be convinced that everyone pays taxes. Everyone who pays rent pays the tax on the real estate that he occupies. On everything purchased in a store taxation is somehow included. The politicians fail to explain this, for it does not suit their book.

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ALL seven of the cast steel stern posts, of which five failed in service in the new 10,000-ton American cruisers, were made to the same pattern. Two that came from one foundry stood all tests. Faulty design seems hardly the cause. For many years American battleships and cruisers have used cast steel stern posts as well as stems and rudders and actual failures have been very few. Steel castings of this nature must be exceedingly carefully made. If weight is to be saved by lighter design, then the use of an alloy steel may be necessary. In any event the utmost thoroughness in heat treatment is essential even when design and composition are satisfactory. Other things being equal a steel casting is only as good as its heat treatment.

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Farm to City Migration Is Steady

MUCH of the talk about the plight of the farmer arises from those who want customers or votes. It may seem unfair to say this, because much talk about other things has the same origin, but there is the difference that "the farmers" constitute, or are thought to constitute, the largest single class of people, supposedly with the same physical wants and the same philosophy of life. It is not new talk. Only members of the older generation can recall the phrase "bleeding Kansas."

Migration from farm to city has sometimes been viewed with alarm and at other times with satisfaction. It is therefore an interesting and important point that this migration, when properly viewed mathematically, has been constant, so constant that it may be regarded as something that is taking care of itself. There is a continuous adjusting and if the adjusting in one direction or the other seems hard the rejoinder is that when it has been at a steady pace so long there would have been greater difficulty if it had proceeded less regularly.

It requires proper analysis to show that in essence the drift has been uniform. Respective percentages of urban and rural population are reported by the census as follows:

	Per Cent of Population	
	Urban	Rural
1890	35.4	64.6
1900	40.0	60.0
1910	45.8	54.2
1920	51.4	48.6
1930	56.2	43.8

The number of points change decade by decade cannot of course be considered. Both columns show, and if extended would continue to show, a diminishing change in points. If there were not that progression, eventually the rural population would be a minus quantity.

The proper analysis is to consider the successive percentage decreases in the proportion of rural popu-

lation. From 1890 to 1900 the rural proportion decreased from 64.6 per cent to 60.0 per cent, which is 7.1 per cent decrease. For the next three enumerations the decreases were 9.7 per cent, 10.3 per cent and 9.9 per cent. These enumerations were taken at different dates whereby the elapsed time varied from an even ten years. Allowing for this, the last three decreases were 9.8 per cent, 10.6 per cent and 9.7 per cent. The middle one is the largest and includes the period of the war, which is sufficient explanation.

Thus the trend has really been remarkably uniform since 1900. It has been a case of the proportion of rural population decreasing just 10 per cent per decade. As total population has increased more than 10 per cent per decade the actual number of rural population has increased, but this has nothing to do with the matter.

Such a trend can continue indefinitely; the rural population would never get down to zero. Year by year the proportion of total population migrating from farm to city would decrease. The pressure to migrate would be decreasing and the adjusting necessary would be decreasing. Of course all changes are likely to be more or less awkward, but when something moves so uniformly as this has done it appears to be doing the best it can.

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Aircraft's Debt to Metallurgy

IT has been said that recent successes in the conquest of the air have been owing largely to improved metals and alloys, that the more powerful planes and engines are the result of new developments in metallurgy and heat treatment. This is, to a large extent, true in the case of alloy steels and alloys which go into the engines. There is an increasing use of nitrided alloy steels and of the strong light alloys of magnesium, both of which have been developed to a commercial status since 1927. A lighter engine of strength equal to or greater than that of earlier ones has been made possible. But chrome-molybdenum steel tubing still constitutes the backbone of the present plane, improved however by better processes of manufacture and more refined methods of heat treatment.

Apart from the progress made in reducing the frictional resistance of the plane to movement through the air, as well as other effective refinements, metallurgy and heat treatment undoubtedly are responsible primarily for the success both of yesterday and today, admitted that there is enhanced skill in piloting and navigating. The exploits of 1931 in speed and endurance certainly are proofs of the dependability of modern aircraft and highly encouraging respecting its immediate future.

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A LEARNED professor discussing the communistic economy as developed in Russia comes to the conclusion that its methods will not be stimulative of discovery in science or invention in technology. Academically we may agree with him, but practically the point seems to be immaterial so long as the Soviet administration can buy and apply the science and invention of America and Germany.

▲ ▲ ▲ CORRESPONDENCE ▲ ▲ ▲

Demand Wage and Price Cuts

To the Editor: I read with a great deal of interest Mr. Joseph L. Snider's thoughtfully considered article on wage reductions. The article left me with possibly the impression that wage reductions could be more harmful than beneficial, which would be true to the extent that Mr. Snider carried his reasoning.

However, it would seem conceivable to the writer that wage reductions when effected could result in lower production costs, which in turn could be passed on to consumers by manufacturers by way of lower prices as Mr. Snider points out. As Mr. Snider explains, such a policy might not result in immediate benefit to the manufacturers in question. Nevertheless given reasonable time to impress consumers with the bargaining feature of lower prices is it not reasonable to feel that unit consumption would increase?

Although an increase in unit consumption would have to be carried to quite a high degree to yield a profit to the manufacturer, nevertheless, any increase in unit consumption should concurrently bring with it an increase in manufacturing production. In turn, an increase in production schedules by manufacturers should carry with it an increase in employment.

While increased employment would be at a lower wage scale than has existed, the general purchasing power of the wage group as a whole would be increased by any advance in manufacturing operating schedules; and hence any immediate loss of purchasing power resulting from wage reductions should, within a reasonable length of time, be made up and more than balanced by an increased purchasing power springing from the labor group at large as employment increases with increased consumers' demand.

A. L. MILLS, JR.
Vice-president, First National Bank.
Portland, Ore.

To the Editor: I cannot agree with Snider's statement (your issue of Aug. 6) that prices cannot be reduced in proportion to cuts in wage rates, when wholesale prices on all commodities average 30 per cent lower than 1925-29 prices, and retail prices are 20 per cent lower—this to the accompaniment of little or no lowering of wage rates as yet.

I also cannot agree with his statement that a cut in wage rates will reduce the purchasing power of the country at the present time. Manifestly the purchasing power of the country is the product of three factors—number employed, days employed, and the wage rate, divided by a fourth, the exchange value of commodities. Prosperous times are simply those wherein these factors are in balance, and a heavy volume of trade naturally flows.

Today, these factors have been thrown out of balance by a decline in commodity values of such severity as to preclude the barbarian theory of restoring prices through curtailment of production and allowing excess labor to starve.

Undoubtedly in minor depressions a little blood-letting of a few may do the greatest good for the greatest number, but not so in the present case. American business is set up to make a small profit on a large volume of business, and our losses on a heavy curtailment program would necessitate too much starvation before the hoarded money of the fortunate employed would become less attractive than commodities at their then values.

American business men are not faced with the prob-

lem today set out by Mr. Snider, but by the following example:

	General Manufacturing					
	Past		Present		Future	
Selling price	$11.00		$9.90		$8.80	
Cost of production:						
Materials	$5.00		$3.50		$3.50	
Labor	2.50		2.75		2.25	
Overhead	2.50	$10.00	5.00	$11.25	2.50	$8.25
Net margin		$1.00		— $1.35		$0.55

That is, the American manufacturer, with an article selling at $11 has been able to make a $1 profit per unit on full time. This material costs on the average 50 per cent of his total cost, and labor and overhead comprise the balance, about equally divided. Since 1929 he has valiantly striven to maintain the price of his product by curtailing to half time, and because of competition he has only been able to hold it to 90 per cent. He has maintained his $5 a day wages, and has bought his supplies on a hand-to-mouth basis, and liquidated his stocks of high-priced materials. Today he finds himself losing money even on the 30 per cent lower material cost, and finds the market unwilling to take additional articles at the same selling price. His old tin box is getting empty of cash and Liberty bonds after two years' drain. Shall he shut down, continue his curtailment, or adjust himself to the probable future business basis?

The first two alternatives are practical only in a depression of limited depth and duration, for in the present one they mean bankruptcy of the concern at the profit of no one but his richer competitors.

The third alternative of adjusting his prices where he can again operate at full time, and adjusting his labor rate a moderate amount, say 10 per cent, he again becomes a constructive force in the community, and everyone profits, including the United States Government. His labor, by the way, profits most, for they have full employment and the contents of their weekly envelope will buy 3.1 of the units they make, compared to that same envelope buying 2.7 units back in 1929 and 1.5 units under the present curtailment program. Meanwhile the raw material supplier is helped by having the greater part of the decline in his price made up by an adjusted exchange value of the finished unit, and is started back to the prosperous highway, too.

W. A. RICHARDS
Bluefield, W. Va. President, Sovereign Pocahontas Co.

To the Editor: Your article on wage reductions by Joseph L. Snider, in the issue of Aug. 6, appears to me to reason from false premises to false conclusions. The first assumption is that the buying power of the country is composed of wages only. This ignores the entire agricultural industry, the entire so-called capitalist class, and others whose incomes are in other forms than wages.

The attitude of the agricultural industry toward prices and wages is very well summed up in a remark made to me recently by a real dirt farmer. The remark was "you can't buy many $600 tractors with 20c oats." This remark expanded to cover the whole field of agricultural implements and agricultural products is a sufficient reason for the present almost complete paralysis of agricultural implement manufacturing.

The agricultural implement manufacturer's costs consist of his labor, material, and overhead. Going back one step further, the "material" so called at each previous stage back to the ore in its native state in the ground consists of this same labor, material and overhead. But, the ore as it lies in the ground has no real value. Overhead expenses of all manufacturers consist largely of labor either direct or indirect. Transportation charges at the present time consist of about 45 per cent of direct labor and the other 55 per cent consists of the relatively small amounts paid as dividends, together with the large amounts paid in taxes, materials, etc., all of which may be resolved back to labor.

Therefore, the final cost of all manufactured articles is composed of labor either direct or indirect in the form of equipment previously manufactured under the same conditions. The charge for the use of equipment previously manufactured appears in the form of rent of factory, hire of equipment and similar forms.

Now since the final cost of every manufactured article is made up of accumulated wage payments, either direct or indirect, from the original ore to the finished machine, the assumption that wage reductions all along the line from the ore to the machine would not bring lower prices is unfounded.

The agricultural industry is substantially on a world price basis. This makes any early or substantial price increases impossible. Therefore, the only way for the manufacturing and transportation industries to increase the sale of tractors, threshing machines, plows, and other machinery to farmers is to readjust wages and other costs so that the prices of agricultural machinery will be in proportion to the prices of farm products.

The use of labor saving machinery is highly important to the agricultural industry. The manufacture of agricultural machinery is one of the very large industries, so large in fact, that the resumption of normal activity would make a substantial increase in general business directly and also indirectly by the purchases from other lines.

A second false premise in Mr. Snider's article is that price reductions discourage purchases. The fact is that the fear of price reductions discourages purchases. When price reductions have been made and a permanent level has been reached, fear disappears and purchases are made. At the present time, it is well known that prices are being maintained at an artificial level by pressure against reductions in wages. When this pressure is removed and the natural level of supply and demand has had a free chance to operate, normal business will be at hand.

W. E. JOHNSTON
Minneapolis Johnston Mfg. Co.

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Heat Treating Chromium Plate

(*Concluded from page* 493)

resulting marked increase in the durability. Single layers of other metals can also be made to show a marked increase in resistance to corrosion, either by using the proper conditions for plating or by heat treatment of the deposit after plating.

In dealing with composite layers of different metals the problem is a little more difficult, since when subjected to heat the hydrogen that is driven from the lower layers of metal tends to rupture the deposits on top. This, of course, allows the corrosive agents to work their way through to the base metal and, even though the chromium is not attacked, the corrosion products from the base metal work out to the surface. We are continuing our work on this phase of the problem.

In general, we can say, however, that heat treatment of electrodeposits seems to offer to the plater a much needed means of increasing the resistance of his product to the many forms of corrosion it is called upon to resist.

Automotive Specifications And Line Pipe Tonnage Brighten Outlook

ACTUAL Gain in Bookings Is Small—Ingot Output, Increasingly Irregular, Averages 32 Per Cent—Foreign Steel a Factor on Coast

A SLIGHT gain in steel demand, mainly as the result of specifications from the automobile industry, and prospective increases in line pipe bookings, structural steel awards and rail releases have strengthened the hopes of iron and steel producers for a seasonal upturn in business.

While current orders from motor car builders are too small and too scattered to throw much light on September assembly schedules, they are interpreted as portending larger and more widely distributed releases. The outlook in line pipe is more clearly defined. Orders about to be placed include 36,000 tons for the Stanoland Pipe Line Co. and 15,000 tons for the Lycoming Natural Gas Co., which, with smaller tonnages approaching the closing stage, are counted on to sustain the recently increased operations of electric weld and seamless pipe mills until the end of the current quarter.

RAIL specifications are still irregular, as evidenced by the shutting down of the Pittsburgh district mill after a week's run, but will be heavier next month. Releases for September rolling thus far received at Chicago point to a gain of 25 to 50 per cent in Western rail mill operations.

Fabricated steel awards, at 13,000 tons, are the smallest reported for any week since April. However, several large tonnages are on the verge of being placed and new projects, totaling 24,000 tons, have come up for figures. Mill shipments of both structural steel and reinforcing bars have been holding up well, with the likelihood that they will continue to make a good showing. A negative factor so far as concrete bars are concerned is a controversy in Illinois regarding that State's "standard wage" law, which may delay the award of more than $10,000,000 worth of road work until next year.

MISCELLANEOUS manufacturing consumers of iron and steel have as yet given little indication of an impending seasonal upturn in their requirements. Makers of textile and shoe machinery have increased their specifications in cold-finished bars, and demand for tack plate is more active, but the total steel tonnage involved is insignificant. A few releases have come from the farm equipment industry, but it is a question whether much improvement can be expected from that quarter in view of depressed agricultural conditions. In this connection it is to be noted that country trade in wire products, which ordinarily picks up at this time of the year, is very backward.

Tin plate production, which has held up unusually well throughout the depression, has declined to the 50 per cent of capacity, the lowest rate of the year. Container manufacturers are specifying sparingly, pending the receipt of final reports on the tomato and corn crops.

STEEL ingot production still fails to show a uniform trend. The intermittent operations now characteristic of various steel finishing departments continue to be reflected in irregularities in raw steel output. Gains in ingot production at Cleveland and Chicago are in contrast with losses at Buffalo, Birmingham and Pittsburgh. The average rate for the country at large is estimated at 32 per cent, compared with 30 per cent in the previous week.

APATHY rules in the scrap trade, and pig iron prices are holding at recent levels in most markets. Sheets and strips, as well as bars, plates and shapes, are well maintained at current quotations on such business as is now coming out. Bolts and nuts and cast iron pipe, however, continue to be subject to rather widespread concessions. Of local significance is the increasing pressure of foreign competition on the Pacific Coast, especially for business in reinforcing bars, wire products and light shapes.

Production of sheets by independent mills in July gained 27,000 tons, while shipments increased 22,000 tons. Unfilled orders declined more than 100,000 tons. The rise in production and shipments was doubtless due in part to the increase in specifications that followed recent advances in prices.

Consumption of Lake ore in July was 1,832,382 tons, a decrease of 281,888 tons from June. The amount used in July, 1930, was 3,837,567 tons.

THE IRON AGE composite prices are unchanged, pig iron at $15.50 a ton, steel scrap at $9.25 a ton and finished steel at 2.116c. a lb.

PITTSBURGH

Mild Improvement in Steel Buying Due Mostly to Automobile Industry

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A slight gain in steel orders is accounted for largely by automobile buying.

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Sheets, strip steel and cold-finished steel bars are products chiefly affected.

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Inquiries in the market for line pipe total 50,000 tons, soon to be placed.

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Ingot operations are lower, however, being estimated at 28 per cent for district, compared with 30 per cent the previous week.

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PITTSBURGH, Aug. 18.—Finished steel releases during the last week were slightly heavier than during the first week of the month. The change has been scarcely noticeable, but is believed to be the first evidence of a seasonal improvement in demand. It is significant that the improvements in tonnage have largely been accounted for by sheets, strip steel and cold-finished steel bars going to the automobile industry. The releases of one or two large motor car producers were satisfactory, but other consumers in this field seem to be restricting their September tonnage to a minimum. Gains are also reported in the demand of makers of textile and shoe-making machinery, although the tonnage is insignificant.

Non-manufacturing consumers are still providing the heaviest demand for steel products. Shipments of reinforcing bars and structural shapes, while falling somewhat under those of July, are relatively good. The movement of line pipe is well sustained, and new inquiry during the week, which will soon result in additional orders, totals more than 50,000 tons. Of this amount, 36,000 tons, or 350 miles, of pipe is wanted by a large oil company. The addition of this tonnage to mill backlogs will easily enable the larger producers to operate at the present rate in electric weld and seamless mills for the remainder of the quarter, and possibly bring about some gains. The railroads are still inactive in spite of reports of early car purchases by large Eastern interests. Mills can see no prospect of early placement of rail orders, and the local rail mill, which operated last week following a fortnight's suspension, is idle again this week.

Steel ingot production is still difficult to gage because of the intermittent schedules at a number of plants. The smaller independent companies in the immediate Pittsburgh district are scarcely averaging 20 per cent of capacity, and the schedules of the larger interests do not average better than 30. Under the circumstances, aggregate production in the district has again dropped under 30 per cent, and may be estimated at 28 per cent, a figure reached only once before during the summer. In the Wheeling district production is unchanged at about 45 per cent, while output in the Valleys has been checked sharply by a suspension of activity at an important plant.

In the immediate finishing lines, strip steel alone shows a slight gain, while further curtailment is evident in tin mill operations. This industry is now running at 50 per cent of capacity, the lowest rate of the year.

The price structure shows no change and is the most favorable factor of the present situation. Mills are having no difficulty in adhering to the new sheet schedules on such business as is coming out, while strip steel is well maintained on both hot and cold-rolled. Deviations from 1.60c., Pittsburgh, on bars, plates and shapes are encountered only on the most desirable of orders. Weakness continues in bolts and nuts.

The scrap market is still holding its own, but strength is maintained by the attitude of dealers rather than by mill purchases. Pig iron is very dull, and no activity is reported in coal and coke. Slack prices are definitely lower.

SEMI-FINISHED STEEL

New business is negligible. Shipments this month are somewhat lighter than they were during July because of the reduced requirements of non-integrated makers of sheets and strip. The market on billets, slabs and sheet bars is nominal at $29, Pittsburgh or Youngstown, with forging billets holding at $35. Wire rods are quiet, and the price is unchanged at $35, Pittsburgh.

PIG IRON

Recent small inquiries which were reported in this market have either been withdrawn or covered and scarcely any business is pending. Shipments of all leading producers are running behind those of July, and sales are confined to carload lots. Reports of price weakness can usually be traced to sales of off-grade iron or freight rate equalization. Bessemer, malleable and foundry iron are still quotable at $17, Valley, and $17.50, Pittsburgh furnace. Basic is nominal at $15.50 to $16.

Prices per gross ton, f.o.b. Valley furnace:

Basic	$15.50 to $16.00
Bessemer	17.00
Gray forge	16.50
No. 2 foundry	17.00
No. 3 foundry	16.50
Malleable	17.00
Low phos., copper free	26.66 to 27.00

Freight rate to Pittsburgh or Cleveland district, $1.76.

Prices per gross ton, f.o.b. Pittsburgh district furnace:

Basic	$16.00 to $16.50
No. 2 foundry	17.50
No. 3 foundry	17.00
Malleable	17.50
Bessemer	17.50

Freight rates to points in Pittsburgh district range from 63c. to $1.13.

RAILS AND TRACK SUPPLIES

Bids were taken last week by the Cincinnati Union Terminal Co. on 4600 tons of rails, 300 tons of spikes, and rail joints and bolts in the required quantities. No other rail or accessory business is being figured by Eastern mills. Light rails are very dull.

BOLTS, NUTS AND RIVETS

This market is very dull, with production under 25 per cent of capacity. Quotations on bolts and nuts are rather demoralized, with extra discounts not uncommon. Rivets are well maintained.

BARS, PLATES AND SHAPES

Shipments of heavy hot-rolled products so far this month have fallen under July levels, although the change is not considered significant. Reinforcing bars and structural steel are still moving in fair volume, although merchant bars and plates going to the manufacturing industries are extremely dull. Makers of automobiles and accessories have made small releases of alloy steel bars for September shipments, but the volume of specifications to date is not considered indicative of September production schedules. A few railroad freight car inquiries are reported to be imminent, but no definite action has been taken, and car builders are not particularly hopeful about business in this field. Barge yards are reaching the end of their backlogs, and new orders are slow in being placed.

The price situation is considered satisfactory, although makers admit that the 1.60c., Pittsburgh, quotation

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous, Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	Aug. 18, 1931	Aug. 11, 1931	July 21, 1931	Aug. 19, 1930
No. 2 fdy., Philadelphia	$16.76	$16.76	$17.01	$19.76
No. 2, Valley furnace	17.00	17.00	17.00	18.00
No. 2 Southern, Cin'ti	14.69	14.69	14.69	15.69
No. 2, Birmingham	12.00	12.00	12.00	14.00
No. 2 foundry, Chicago*	17.50	17.50	17.50	17.50
Basic, del'd eastern Pa	16.75	16.75	16.75	18.75
Basic, Valley furnace	15.50	15.50	15.50	18.00
Valley Bessemer, del'd P'gh	18.76	18.76	18.76	20.26
Malleable, Chicago*	17.50	17.50	17.50	17.50
Malleable, Valley	17.00	17.00	17.00	18.50
L. S. charcoal, Chicago	25.04	25.04	25.04	27.04
Ferromanganese, seab'd carlots	†85.00	†85.00	†85.00	94.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

†Ferromanganese quotations adjusted to carload unit; larger quantities at discounts.

Rails, Billets, etc., Per Gross Ton:				
Rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	34.00	34.00	34.00	36.00
Rerolling billets, Pittsburgh	29.00	29.00	29.00	31.00
Sheet bars, Pittsburgh	29.00	29.00	29.00	31.00
Slabs, Pittsburgh	29.00	29.00	29.00	31.00
Forging billets, Pittsburgh	35.00	35.00	35.00	36.00
Wire rods, Pittsburgh	35.00	35.00	35.00	36.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.60	1.60	1.60	1.70

Finished Steel, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.60	1.60	1.60	1.65
Bars, Chicago	1.70	1.70	1.70	1.75
Bars, Cleveland	1.65	1.65	1.65	1.70
Bars, New York	1.93	1.93	1.93	1.98
Tank plates, Pittsburgh	1.60	1.60	1.60	1.60
Tank plates, Chicago	1.70	1.70	1.70	1.75
Tank plates, New York	1.88	1.88	1.88	1.88
Structural shapes, Pittsburgh	1.60	1.60	1.60	1.60
Structural shapes, Chicago	1.70	1.70	1.70	1.75
Structural shapes, New York	1.85½	1.85½	1.85½	1.85½
Cold-finished bars, P'gh	2.10	2.10	2.10	2.10
Hot-rolled strips, P'gh	1.55	1.55	1.55	1.65
Cold-rolled strips, P'gh	2.15	2.15	2.15	2.35

Finished Steel, *Per Lb. to Large Buyers:*	Aug. 18, 1931 Cents	Aug. 11, 1931 Cents	July 21, 1931 Cents	Aug. 19, 1930 Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.40	2.40	2.40	2.45
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	2.50	2.50	2.50	2.55
Sheets, galv., No. 24, P'gh	2.90	2.90	2.90	3.05
Sheets, galv., No. 24, Chicago dist. mill	3.00	3.00	3.00	3.15
Hot-rolled sheets, No. 10, Pittsburgh	1.70	1.70	1.70	...
Hot-rolled sheets, No. 10, Chicago dist. mill	1.80	1.80	1.80	...
Wire nails, Pittsburgh	1.90	1.90	1.80	2.05
Wire nails, Chicago dist. mill	1.95	1.95	1.85	2.10
Plain wire, Pittsburgh	2.20	2.20	2.20	2.30
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.35
Barbed wire, galv., P'gh	2.55	2.55	2.55	2.80
Barbed wire, galv., Chicago dist. mill	2.60	2.60	2.60	2.85
Tin plate, 100 lb. box, P'gh	$5.00	$5.00	$5.00	$5.25

Old Material, Per Gross Ton:				
Heavy melting steel, P'gh	$10.75	$10.75	$10.75	$15.25
Heavy melting steel, Phila	8.75	8.75	8.25	12.50
Heavy melting steel, Ch'go	8.25	8.25	8.75	12.00
Carwheels, Chicago	9.50	10.00	10.00	13.50
Carwheels, Philadelphia	12.00	12.00	12.00	14.50
No. 1 cast, Pittsburgh	11.00	11.00	10.50	13.50
No. 1 cast, Philadelphia	11.50	11.50	11.50	13.00
No. 1 cast, Ch'go (net ton)	9.00	9.00	9.00	12.00
No. 1 RR. wrot., Phila	10.00	10.00	10.00	15.00
No. 1 RR. wrot., Ch'go (net)	7.00	7.00	7.00	10.00

Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$2.40	$2.40	$2.40	$2.60
Foundry coke, prompt	3.50	3.50	3.50	3.50

Metals, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Lake copper, New York	7.87½	8.12½	8.12½	11.12½
Electrolytic copper, refinery	7.25	7.25	7.75	10.75
Tin (Straits), New York	**25.70**	25.12½	25.00	30.20
Zinc, East St. Louis	3.80	3.82½	3.90	4.40
Zinc, New York	4.15	4.17½	4.25	4.75
Lead, St. Louis	4.22½	4.22½	4.22½	5.35
Lead, New York	4.40	4.40	4.40	5.50
Antimony (Asiatic), N. Y.	6.60	6.60	6.75	7.75

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

is receiving little test. On small lots the figure is exceptionally well maintained.

COLD-FINISHED STEEL BARS

Business last week showed a slight improvement over that of the preceding fortnight, and a few releases from the automobile industry have come in in the last day or two. In most cases the tonnage involved is very light. Business is well diversified, although some lines, such as the makers of textile and shoe manufacture machinery, have increased their needs considerably in the last few weeks. Mill operations average about 20 to 25 per cent of capacity, and prices are well held at 2.10c., Pittsburgh.

WIRE PRODUCTS

Some makers of merchant wire products report a slight increase in interest during the last week, and specifications for manufacturers' wire show limited gains. Sentiment in the trade is considerably improved. Prices on current small lots are well maintained at $1.90 a keg on nails, and 2.20c. on manufacturers' wire.

TUBULAR GOODS

The Stanoland Pipe Line Co., Tulsa, Okla., is expected to take action immediately on 350 miles of 12¾-in., 10¾-in. and 8⅝-in. pipe, amounting to about 36,000 tons. The extension to the Lycoming Natural Gas Co.'s line in New York State, mentioned last week, is also being hurried for early ordering. This will require 15,000 tons of 10¾-in. pipe, 95 miles in length. The Skelly Oil Co. is also in the market for a small tonnage of 6 and 10-in. line pipe. The Cincinnati Union Terminal Co. took bids last week on approximately 2000 tons of pipe. The award of the Texas Empire Pipe Line Co. line, announced last week, has added to backlogs of seamless mills in the Pittsburgh district. Operations of both seamless and electric weld units are well maintained, and, with the placing of tonnage now in prospect, present schedules will probably be extended throughout the remainder of the quarter. Lapweld activity is still very light, and standard pipe shows no change. Conservation programs in the Texas-Oklahoma fields are not yet reflected in demand for drill pipe and other oil country goods. Mechanical tubing is very dull, but there is some movement of locomotive and boiler tubes.

SHEETS

No new buying of any consequence is reported, and shipments are running as much as 20 per cent under those of July. This was to be expected in view of the efforts of mills to advance prices last month. Automobile body builders are releasing a little tonnage for new model bodies, but shipments will be deferred in many cases until after the end of the month. Radio manufacturers are still stepping up their requirements. Tack plate is rather active, reflecting the higher production of the boot and shoe industry. Production of sheets in the ordinary finishes is averaging about 35 per cent of capacity, with full finishing facilities engaged at a

THE IRON AGE COMPOSITE PRICES

	Finished Steel	Pig Iron	Steel Scrap
Aug. 18, 1931	2.116c. a Lb.	$15.50 a Gross Ton	$9.25 a Gross Ton
One week ago	2.116c.	15.54	9.25
One month ago	2.116c.	15.54	9.25
One year ago	2.156c.	16.88	13.25
	Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1931	2.142c., Jan. 13	2.102c., June 2	$15.90, Jan. 6	$15.54, July 21	$11.33, Jan. 6	$9.08, June 23
1930	2.362c., Jan. 7	2.121c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.412c., April 2	2.362c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.391c., Dec. 11	2.314c., Jan. 3	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.453c., Jan. 4	2.293c., Oct. 25	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22
1926	2.453c., Jan. 5	2.403c., May 18	21.54, Jan. 5	19.46, July 13	17.25, Jan. 5	14.00, June 1
1925	2.560c., Jan. 6	2.396c., Aug. 18	22.50, Jan. 13	18.96, July 7	20.83, Jan. 13	15.08, May 5

much lower rate. Prices on the ordinary finishes continue to hold on such buying as is reported. Tin mill black plate is now quotable at 2.50c. to 2.60c., Pittsburgh, and enameling stock is well maintained at 3.40c. for the No. 20 gage. Unassorted long ternes are holding well at 3.15c., Pittsburgh.

TIN PLATE

Tin mill operations this week are estimated at about 50 per cent of capacity, a slight decline from the previous comparable period. The leading interest has maintained production, but some of the independents are running intermittently. Some of them are only active every other week, while others are reducing the number of mills and turns. The larger container manufacturers are specifying only in a limited way, and any marked change probably awaits the final reports on the tomato and corn crops. Shipments of tin plate this month are running about 10 per cent under those of July.

STRIP STEEL

Some makers report a slight increase in releases, but the business is confined largely to a few automobile makers, and not all the strip producers are benefiting. Some mills expect a considerable upturn in the next two weeks, but others believe that automobile production schedules will not be decided upon before Labor Day, thus further postponing steel orders. Strip demand from other sources is at a very low rate. Operations average about 25 per cent for hot-rolled, and somewhat less for cold-rolled strip. This reflects a slight gain from the preceding week. Prices are very well held at 1.55c. and 1.65c., Pittsburgh, for hot-rolled strip, and 2.15c. on cold-rolled.

COKE AND COAL

Additional price weakness is reported in the coal market, with shading particularly apparent in slack. There is little demand for the other grades of coal, and prices, though weak, are not quotably lower. Coke is still very quiet, with the furnace grade quoted at $2.40, Connellsville, and foundry at $3.25 to $3.50. The premium grades of foundry coke are well established at $4.50.

OLD MATERIAL

The scrap market has maintained its strength in a general way, although hydraulic compressed sheets are slightly weaker at a range of $10 to $10.50. One consumer has purchased a very small tonnage at $10.25, and several dealers are willing to sell at $10.50. On the other hand, only occasional distress lots of No. 1 heavy melting steel can be bought for less than $10.75, and dealers are unwilling to sell in large lots for less than $11. They are willing to pay more than this for railroad lists to be laid down in their yards. It is still relatively difficult to buy against old contracts at less than $10.50. The blast furnace grades continue rather strong, with one dealer bidding from $7.75 to $8 to cover at a consuming point. The acid open-hearth grades are rather weak, but unchanged in price. Scarcely any foundry buying is reported.

Warehouse Prices, f.o.b. Pittsburgh

	*Base per Lb.
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.60c.
Reinforcing steel bars	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons	3.10c.
Squares and flats	3.60c.
Bands	2.95c.
Hoops	3.95c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.05c.
Galv. sheets (No. 24), 25 or more bundles	3.40c.
Hot-rolled sheets (No. 10)	3.15c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.)	3.74c.
Spikes, large	2.50c.
Small	2.75c. to 2.90c.
Boat	3.00c.
Track bolts, all sizes, per 100 count,	70 and 10 per cent off list
Machine bolts, 100 count,	70 and 10 per cent off list
Carriage bolts, 100 count,	70 and 10 per cent off list
Nuts, all styles, 100 count,	70 and 10 per cent off list
Large rivets, base per 100 lb.	$3.20
Wire, black, soft ann'l'd, base per 100 lb.	2.30
Wire, galv. soft, base per 100 lb.	2.75
Common wire nails, per keg	2.05
Cement coated nails, per keg	2.05

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 999 lb.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$10.50 to $11.00
No. 2 heavy melting steel	9.50 to 10.00
Scrap rails	10.50 to 11.00
Compressed sheet steel	10.00 to 10.50
Bundled sheets, sides and ends	9.00 to 9.50
Cast iron carwheels	10.50 to 11.00
Sheet bar crops, ordinary	11.50 to 12.00
Heavy breakable cast	8.00 to 8.50
No. 2 railroad wrought	10.50 to 11.00
Hvy. steel axle turnings	9.50 to 10.00
Machine shop turnings	7.00 to 7.50
Acid Open-Hearth Grades:	
Railr. knuckles and couplers	12.75 to 13.25
Railr. coil and leaf springs	12.75 to 13.25
Rolled steel wheels	12.75 to 13.25
Low phos. billet and bloom ends	14.50 to 15.00
Low phos. mill plates	12.50 to 13.00
Low phos. light grades	12.50 to 13.00
Low phos. sheet bar crops	13.00 to 13.50
Heavy steel axle turnings	9.50 to 10.00
Electric Furnace Grades:	
Low phos. punchings	13.50 to 14.00
Heavy steel axle turnings	9.50 to 10.00
Blast Furnace Grades:	
Short shoveling steel turnings	7.50 to 8.00
Short mixed borings and turnings	7.50 to 8.00
Cast iron borings	7.50 to 8.00
Rolling Mill Grades:	
Steel car axles	16.50 to 17.50
Cupola Grades:	
No. 1 cast	10.50 to 11.50
Rails 3 ft. and under	12.50 to 13.00

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Superior Steel Corpn., Pittsburgh, in the quarter ended June 30 had net loss of $96,609, comparing with a loss of $108,979 in the corresponding quarter last year. The corporation's loss in the first six months of 1931 amounted to $241,037, compared with $182,359 in the corresponding 1930 period.

CHICAGO

Steel Orders More Diversified with Total Tonnage Up a Little

CHICAGO, Aug. 18.—Greater diversity in the use of steel mill products is a recent development in this market, which is gradually absorbing a larger tonnage. However, the trend is not without some unevenness such as a lighter use of sheet bars and the extreme dullness of the wire market at a time when seasonal influences should be bringing heavier shipments.

Because of unexpected setbacks, ingot output has gained only moderately to a shade above 30 per cent of capacity. Of 36 steel mill blast furnaces in this district, only eight are in blast, the furnace at Joliet having been banked principally for the reason that Bessemer rods are moving very slowly to wire mills.

New buying of finished steel products is sluggish, while, on the other hand, specifications are in sufficient volume to mark the past week as among the best in about two months.

Here and there is a market indicator that gives some clew as to what the future will bring. Railroad car wrecking is moving at a fast pace and the used car equipment market is active. Fabricators are taking more steel and are having more opportunity to estimate new projects. Automobile manufacturers are said to be arranging September shipments of steel, and schedules so far arranged point to increased production. A few specifications from farm implement manufacturers give strength to reports that several major plants will resume operations on a larger scale about mid-September. Rail releases for early September shipment are larger and it is not unlikely that rail rolling programs will be stepped up more than 25 per cent from the present rate soon after the turn of the month.

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Although trend of steel business is uneven, greater diversification of business is noticeable, and total tonnage has gained slightly.

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Blast furnace at Joliet, Ill., again banked because of poor demand for Bessemer wire rods.

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September automobile schedules expected to be larger. Some farm machinery plants may resume production.

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Prospect of larger operations next month includes possibility of step-up in rail rollings.

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PIG IRON

A cargo of Lake Erie steel mill pig iron has arrived at Chicago. This is the second cargo to reach this port so far this year. Interest in Northern foundry iron is slowly growing in the form of sales, some of which are for the remainder of the year. There is little variation in shipments, but releases entered for delivery after Sept. 1 point to heavier shipments in the coming month. Prices for local delivery are steady at $17.50 a ton, local furnace. Southern iron for delivery to Chicago and vicinity is quiet, and only small quantities of charcoal iron are moving to consumers. Specifications for silvery are light and spot purchases are in limited quantities. Taken as a whole, August will show improvement over July only to the extent that last month carried the burden of shutdowns and vacation periods.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	$17.50
N'th'n No. 1 fdy., sil. 2.25 to 2.75	18.00
Malleable, not over 2.25 sil.	17.50
High phosphorus	17.50
Lake Super. charcoal, sil. 1.50	$25.04 to 27.04
S'th'n No. 2 fdy.	17.01
Low phos., sil. 1 to 2, copper free	28.50 to 29.20
Silvery, sil. 8 per cent	24.79 to 26.79
Bess. ferrosilicon, 14-15 per cent	35.79

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including an average switching charge of 61c. per gross ton.

CAST IRON PIPE

Public lettings and inquiries are very scarce. There seems to be few plans in course of preparation that point to a change. Word comes from Fort Wayne, Ind., that a filtration plant is to be constructed there. This undertaking is of sufficient importance to indicate that a round tonnage of cast iron pipe will be required. Kenosha, Wis., will open bids soon on about 700 tons of 16 to 24-in. Class C pipe. A few contractors have ordered pipe recently and there is more work of this kind, including the tonnages needed for the Calumet sewage plant development near Chicago. John Griffiths & Sons Co. was successful bidder on the first letting. Although bids have been opened on the second section, there is some uncertainty as to who will get the job. The market is characterized by a fair sprinkling of small tonnages, but without the usual long runs of pipe. Prices are still on an unstable footing, with sellers trying to maintain $35 a ton, Birmingham, on small lots of 6-in. and larger pipe.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, $42 to $44; 4-in., $45 to $47; Class A and gas pipe, $3 extra.

SHEETS

Operations have dropped to a shade under 35 per cent of capacity, as this market remains one in which rolling schedules are almost wholly dependent on the miscellaneous small orders received from day to day. Industries which can usually be counted on at this time of year for growing tonnages are offering little support to the market. Jobbers are taking only small lots.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.40c. to 2.50c.; No. 24 galv., 2.95c. to 3.05c.; No. 10 blue ann'l'd, 2.00c. to 2.10c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

FERROALLOYS

Practically every phase of this market is extremely quiet. Spot buying has not been in evidence for many weeks and shipments are as low as they have been at any time so far this year.

RAILS AND TRACK SUPPLIES

Releases of standard-section rails and the railroads' attitude toward heavier acceptances in the early fall point to rolling schedules that will be from 25 to 50 per cent heavier than at present, it now being difficult to maintain output at 20 per cent of capacity. Sales of both rails and fastenings are dull. Shipments of track supplies have gained a trifle, and there is promise that the September movement will show gains over the present rate.

BOLTS, NUTS AND RIVETS

This market is dull and there are no indications of a change in sight. A few small specifications from farm implement manufacturers lend some brightness to the market, but jobbers, who at this time are usually prepared to replenish stocks, are holding back. Prices are unstable and shading is more frequent than heretofore.

WIRE PRODUCTS

The manufacturing trade continues to mark time, but this situation is not so disturbing to producers as is the backwardness of jobbers and the dullness of retail trade throughout most of the country. Under normal conditions, jobbers would have been in the market a week or 10 days ago, but

as things now stand they not only are not buying, but give no indication that they are interested in the market. The key to this condition, so far as the country trade is concerned, appears to be the low prices obtained for farm products. Shipments of mesh for paving and building work remain in good volume, but the end of the active season is near at hand. Wire mill output is not above 25 per cent of capacity, though stocks in the hands of producers are small for this time of year.

REINFORCING BARS

The pending list, which recently has grown to impressive size, continues to become heavier and lends much encouragement to bar fabricators. Awards are not in proportion to inquiries, though the tonnage is running ahead of that of August, 1930, in spite of the fact that contracts are unusually slow in being signed. Labor unions are now in dispute with officials at Springfield as to what are standard wages at various points throughout Illinois. There is even a threat of an injunction to stop awards that are to be made under the new wage law. The net result is that over $10,000,000 in road work is delayed and may not be placed before next year.

WAREHOUSE BUSINESS

Volume of orders continues to gain, and in this respect warehouse business is following a normal trend. An encouraging feature is that both city and country are showing favorably in this gain in demand. Warehouses are increasing discounts to 70 per cent off list on machine bolts, carriage bolts, coach and lag screws and hot pressed nuts.

BARS

Specifications for mild steel bars are the best in many weeks. Reinforcing bar warehouses are foremost in releases of this commodity, but it is quite noticeable that use is again broadening among miscellaneous manufacturers. Although the movement of alloy bars is curtailed at the moment, there is excellent prospect that the farm implement industry will soon get under way, and it is reported here that heavier schedules for automobile production are being planned. Rail steel bar production stands at 35 per cent of capacity, with plants operating three to four days a week. The fence post market is beginning to show signs of life.

PLATES

Shipments of this commodity have gained materially, following the recent increase in pipe fabrication. In other directions, the market is quiet except that an inquiry is now before the trade for 1100 tons of plates for oil storage tanks to be erected in the Southwest. The Standard Oil Co. has ordered 100 tank cars. About the only other news in the railroad field is that the Chicago & North Western has sold 7000 cars which are being wrecked.

STRUCTURAL MATERIAL

Awards are rather light at 2500 tons, but inquiries show up well at close to 9000 tons. It is reported here that 7500 tons for a viaduct at Milwaukee will be let in the near future. A review of awards and inquiries still shows that the bulk of tonnage moving in this market comes from public work and that a very small part is privately financed. Of the inquiries reported this week, about 3000 tons is for Illinois bridges. Letting of contracts on this work may be delayed indefinitely because of a dispute that has arisen under the new wage scale law.

COKE

Shipments remain in small volume, though there have been slight increases in several directions. By-product foundry coke prices are steady at $7.50 a ton, local ovens.

OLD MATERIAL

The price situation in the scrap market is mixed; quotations are mostly nominal. While one mill has taken a small tonnage of heavy melting steel at $8.50, delivered, other sales were at lower prices. The willingness of sellers to adjust their prices downward 50c. a ton a week ago, as reported at that time, has possibly helped the market to some extent, as consumers were stubbornly resisting sales efforts and dealers were accumulating cars that could not be placed. Stocks of steel scrap became so large that attention was being given to the possibility of moving some by boat to Lake Erie mills. However, no such movement has occurred, probably because of the risks of rejection, entailing large losses, and the difficulties of inspection. Since the decline in the price a week or so ago, consumers have again been buying in sufficient tonnages to check the accumulations, and the market is on a more even keel. Brokers are engaged in taking in borings for shipment to Lake Erie by water. Supplies are limited and offers are up 25c. a ton. Except on borings, however, the tendency of prices has been toward weakness.

Prices del'd Chicago dist. consumers:

Per Gross Ton

Basic Open-Hearth Grades:		
Heavy melting steel	$8.00 to	$8.50
Shoveling steel	8.00 to	8.50
Frogs, switches and guards, cut apart, and misc. rails	8.00 to	8.50
Factory hyd. comp. sheets	6.50 to	7.00
Drop forge flashings	6.00 to	6.50
No. 1 busheling	6.00 to	6.50
Forg'd cast and r'l'd steel carwheels	8.50 to	9.50
Railroad tires, charg. box size	10.50 to	11.00
Railroad leaf springs cut apart	10.25 to	10.75
Axle turnings	6.75 to	7.25
Acid Open-Hearth Grades:		
Steel couplers and knuckles	9.00 to	9.50
Coil springs	10.50 to	11.00
Electric Furnace Grades:		
Axle turnings	7.25 to	7.75
Low phos. punchings	11.00 to	11.50
Low phos. plates, 12 in. and under	10.50 to	11.00
Blast Furnace Grades:		
Cast iron borings	4.00 to	4.50
Short shoveling turnings	4.00 to	4.50
Machine shop turnings	4.00 to	4.50
Rolling Mill Grades:		
Rerolling rails	10.00 to	10.50
Cupola Grades:		
Steel rails, less than 3 ft.	10.25 to	10.75
Steel rails, less than 2 ft.	11.00 to	11.50
Angle bars, steel	9.25 to	9.75
Cast iron carwheels	9.50 to	10.00
Malleable Grades:		
Railroad	8.25 to	8.75
Agricultural	8.25 to	8.75
Miscellaneous:		
*Relaying rails, 56 to 60 lb.	19.00 to	21.00
*Relaying rails, 65 lb. and heavier	22.00 to	27.00

Per Net Ton

Rolling Mill Grades:		
Iron angle and splice bars	8.50 to	9.00
Iron arch bars and transoms	9.00 to	9.50
Iron car axles	15.50 to	16.50
Steel car axles	12.00 to	12.50
No. 1 railroad wrought	7.00 to	7.50
No. 2 railroad wrought	7.00 to	7.50
No. 1 busheling	5.50 to	6.00
No. 2 busheling	4.00 to	4.50
Locomotive tires, smooth	11.50 to	12.50
Pipes and flues	5.50 to	6.00
Cupola Grades:		
No. 1 machinery cast	9.00 to	9.50
No. 1 railroad cast	7.50 to	8.00
No. 1 agricultural cast	7.00 to	7.50
Stove plate	6.25 to	6.75
Grate bars	5.50 to	6.00
Brake shoes	5.75 to	6.25

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes	3.00c.
Soft steel bars	2.75c.
Reinforcing bars, billet steel	1.55c. to 2.00c.
Rail steel reinforcement—	
For buildings	1.35c. to 1.65c.
Highway slabs	1.50c.
For bridges and culverts	1.65c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.10c.
Flats and squares	3.60c.
*Bands, ¾ in. (in Nos. 10 and 12 gages)	2.95c.
Hoops (No. 14 gage and lighter)	3.50c.
Hot-rolled annealed sheets (No. 24)	3.55c.
Galv. sheets (No. 24)	4.10c.
Hot-rolled sheets (No. 10)	3.20c.
Spikes (⅝ in. and larger)	3.45c.
Track bolts	4.30c.
Rivets, structural	4.00c.
Rivets, boiler	4.00c.
	Per Cent Off List
Machine bolts	70
Carriage bolts	70
Coach and lag screws	70
Hot-pressed nuts, sq., tap. or blank	70
Hot-pressed nuts, hex., tap. or blank	70
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	2.30
Cement c't'd nails, base per keg	2.30

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Great Lakes Steel Corpn. and Michigan Steel division of Great Lakes Steel Corpn. have removed their executive and sales offices from the Union Guardian Building, Detroit, to the foot of Tecumseh Road, Ecorse, Mich., where the Great Lakes plant is located. The change was effective Aug. 1.

CLEVELAND

Demand for Sheets Improves—Steel Operations Rise 12 Points

CLEVELAND, Aug. 18.—A slight uptrend in the demand for sheets is about the only change in the finished steel situation the past week. Some sheet tonnage came from the motor car industry for September requirements and also some orders from consumers in other fields who have about used up their low-priced stocks. Demand for steel bars shows no gain and lack of inquiry indicates that consumers are taking no interest in future requirements. Plates are moving a trifle better in small miscellaneous lots than they have recently.

After a rather steady decline since early in June, steel plant operations in Cleveland this week increased 12 points to 32 per cent of ingot capacity by the starting up of four open-hearth furnaces at the Otis Steel Co. plant after a complete shutdown of two weeks, during which some backlog tonnage was accumulated. This company also started up its sheet and strip mills and one plate mill. Eleven local open-hearth furnaces of 34 are now running.

Aside from some seasonal improvement, steel makers are looking to the motor car industry to supply whatever increase in tonnage may develop during the next few weeks. Parts makers in this territory at present are not doing much and are receiving very little new inquiry from motor car manufacturers. Operations of metal-working plants in other fields still are very low. However, many expect a little improvement early in September.

In the structural field a moderate amount of public work continues to come out, largely in highway bridges. Three hundred and fifty tons of sheet steel piling will be required for dock construction work in Erie, Pa., to be undertaken by the Pennsylvania State Park and Harbor Commission. Demand from railroads continues to be very light. The Wheeling & Lake Erie purchased 125 tons of tie plates.

PIG IRON

There was little activity the past week either in sales or inquiries. The spurt in orders during the previous week or two evidently resulted from sales in outlying territories, presumably at some price concession, as not a great deal of business was taken in Ohio, Indiana and Michigan. One producer the past week sold 3000 tons. Shipments are not maintaining the recently reported lead over July. Malleable foundries in the Michigan territory are awaiting the release of new business by the Ford Motor Co. Prices for delivery in this territory are steady at $16 to $17, Lake furnace, for Ohio and Indiana, $17 to $17.50 for Michigan and $17 Cleveland for local delivery.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25	$17.00
S'th'n fdy., sil. 1.75 to 2.25	17.01
Malleable	17.50
Ohio silvery, 8 per cent	25.00
Stand. low phos., Valley	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; $3 from Jackson, Ohio; $6.01 from Birmingham.

BOLTS, NUTS AND RIVETS

Bolt and nut makers report a slight gain in orders this month from scattering sources outside of the motor car industry. The recent price weakness that resulted in concessions of an additional 10 per cent is claimed to have largely disappeared. Rivets continue very dull. Prices are well maintained.

IRON ORE

Consumption of Lake ore in July amounted to 1,832,382 tons, a decrease of 281,888 tons as compared with June. The amount used in July last year was 3,837,567 tons. Ore at furnaces Aug. 1 amounted to 26,451,560 tons, and the total at furnaces and docks on that date was 31,817,253 tons, compared with 30,515,437 tons on the same date a year ago. Central district furnaces consumed 962,226 tons in July, a decrease from June of 175,089 tons. Lake front furnaces used 845,659 tons, a decrease of 106,373 tons. Eastern furnaces consumed 6254 tons, a decrease of 4253 tons, and all-rail furnaces melted 18,243 tons, a gain of 3827 tons. There were 73 furnaces in blast using Lake ore July 31, a decrease of five for the month.

SHEETS

Orders increased slightly the past week, the gain being largely in small lots from miscellaneous sources, although some business came from the motor car industry. Many consumers have about used up the steel ordered before July 1 at the old prices and this, rather than any increase in operation of consumers' plants, evidently is the cause of the gain in volume of sales. The new prices are to be maintained and a definite test of these prices on substantial tonnages is expected before the end of the month.

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes	2.95c.
Soft steel bars	2.75c.
Reinforc. steel bars	1.75c. to 1.95c.
Cold-fin. rounds and hex.	3.10c.
Cold-fin. flats and sq.	3.60c.
Hoops and bands, No. 12 to ¼ in., inclusive	3.60c.
Hoops and bands, No. 13 and lighter	3.55c.
Cold-finished strip	*3.55c.
Hot-rolled annealed sheets (No. 24)	3.60c.
Galvanized sheets (No. 24)	4.60c.
Hot-rolled sheets (No. 10)	3.00c.
No. 9 ann'l'd wire, per 100 lb.	$2.25
No. 9 galv. wire, per 100 lb.	2.70
Com. wire nails, base per keg	2.10

*Net base, including boxing and cutting to length.

STRIP STEEL

While some business in hot-rolled strip came from the motor car industry during the week, the market as a whole remains very dull. Some of the leading parts makers are not placing new business and are specifying very sparingly. Prices appear to be well maintained at 1.55c. and 1.65c., Pittsburgh, on hot-rolled strip. Cold-rolled material is dull and unchanged at 2.15c., Cleveland.

BARS, PLATES AND SHAPES

Activity is confined largely to structural shapes, although some mills report a gain in small-lot orders for plates. The only sizable structural award reported is 280 tons for a Toledo warehouse. Bids for several bridges, requiring 500 tons, will be taken by the Ohio Highway Commission Aug. 21. There is little activity either in merchant bars or reinforcing bars. Prices are well stabilized at 1.65c., Cleveland, for steel bars for local delivery and outside shipment and 1.60c., Pittsburgh, for plates and shapes.

WIRE PRODUCTS

While some small-lot business in nails is being taken at $1.90 a keg, most jobbers are covered for the quarter at lower prices and a test of the market is not expected until about Oct. 1. Manufacturers' wire is firm at 2.20c.

OLD MATERIAL

Less scrap is moving to steel plants than recently owing to the shutting off of shipments by a Warren consumer. A local mill continues to take some blast furnace scrap. Dealers are buying very little material. Prices are unchanged and nominal.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:		
No. 1 heavy melting steel	$8.50 to	$9.00
No. 2 heavy melting steel	8.00 to	8.50
Compressed sheet steel	7.50 to	8.00
Light bundled sheet stampings	6.50 to	7.00
Drop forge flashings	6.75 to	7.00
Machine-shop turnings	5.00 to	5.50
Short shoveling turnings	6.50 to	7.00
No. 1 railroad wrought	9.50 to	10.00
No. 2 railroad wrought	10.00 to	10.50
No. 1 busheling	6.75 to	7.00
Pipes and flues	5.50 to	6.00
Steel axle turnings	7.50 to	8.00
Acid Open-Hearth Grades:		
Low phos., billet bloom and slab crops	14.00 to	14.50
Blast Furnace Grades:		
Cast iron borings	6.50 to	6.75
Mixed borings and short turnings	6.50 to	6.75
No. 2 busheling	6.00 to	6.25
Cupola Grades:		
No. 1 cast	10.00 to	10.50
Railroad grate bars	6.00 to	6.50
Stove plate	6.00 to	6.50
Rails under 3 ft.	15.00 to	15.50
Miscellaneous:		
Rails for rolling	13.00 to	13.50
Railroad malleable	11.00 to	11.25

NEW YORK

Steel Orders Remain at Low Ebb, but Prices Are Steady

NEW YORK, Aug. 18.—With conditions among district consumers reflecting no improvement, demand for pig iron continues light. Prospective business does not exceed 1500 tons, including 200 tons of Bessemer iron for prompt shipment to Worthington Pump & Machinery Corpn., Harrison, N. J. Sales for the week aggregated 4500 tons, compared with 4200 tons the week before. The American Locomotive Co., Schenectady, N. Y., bought 300 tons of foundry iron against its recent inquiry. The Crane Co., Bridgeport, Conn., which recently inquired for 1200 tons of foundry iron, is understood to have covered for only part of this tonnage, deferring further purchases until the latter part of the month. Prices are unchanged, with Southern iron firm at $11, Birmingham, for Northern shipment.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25	$19.41 to $19.91
*Buff. No. 2, del'd east. N. J.	17.78 to 18.28
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	17.39 to 17.89
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	17.89 to 18.39

Freight rates: $4.91 from Buffalo, $1.39 to $2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of $3.28 a ton from Buffalo.

FINISHED STEEL

While still expecting at least a moderate improvement soon in demand for steel, local steel company sales offices have not yet detected the faintest ripple of increasing interest among consumers. Even those who thought that late August might bring signs of betterment now concede that little or no change in the situation will be discernible until after Labor Day.

The New York Central may build a few hundred cars, possibly as many as 500, in its own shops, but probably will be able to find all of the necessary steel in its own stocks. If any steel is bought it will be only a small quantity.

The steadiness of prices is outstanding. Consumers' orders are so small, however, that pressure for concessions is lessened by that very fact. Sales of a good many hundreds of tons of sheet steel at the new prices have been made in this district during the past week.

CAST IRON PIPE

No outstanding inquiries for pressure pipe came up during the past week. Interest is centered in several large tonnages, previously reported, on which bids will be opened late this week. Recent awards included 1000 tons of 6 to 16-in. pipe by Hartford, Conn., to the American Cast Iron Pipe Co., and 400 tons, various sizes, by a New York utility company to Warren Foundry & Pipe Corpn.

Prices per net ton delivered New York: Water pipe, 6-in. and larger, $32.90; 4-in. and 5-in., $35.90; 3-in., $42.90. Class A and gas pipe, $3 extra.

REINFORCING BARS

Billet steel bars are unchanged at 1.60c. a lb., Pittsburgh, or 1.93c., New York, with concessions of $1 a ton and occasionally more on substantial tonnages. One of the largest projects in this district is a building for the Harlem Valley Hospital at Wingdale, N. Y., requiring about 1000 tons of bars.

OLD MATERIAL

Deliveries of No. 1 heavy melting steel to consumers at Coatesville, Pa., and Claymont, Del., are temporarily suspended, so that the only movement of this grade is by barge to Buffalo at $6.25 a ton, on barge in New York harbor. Brokers are buying machine shop turnings at $6 to $6.50 a ton, delivered eastern Pennsylvania, an advance of 50c. from recent buying prices. Foundry grade stove plate is stronger, with brokers paying $7 a ton, delivered to the consumer at West Mahwah, N. J., and $7.50 a ton, delivered to Bayonne, N. J. Other grades of scrap are inactive and prices generally are unchanged.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	$5.00 to	$6.25
Heavy melting steel (yard)	3.00 to	3.50
No. 1 hvy. breakable cast.	6.50 to	7.00
Stove plate (steel works)		4.00
Locomotive grate bars		4.00
Machine shop turnings	2.50 to	3.00
Short shoveling turnings	2.50 to	3.00
Cast borings (blast fur. or steel works)	2.50 to	3.00
Mixed borings and turnings		2.00
Steel car axles	12.75 to	13.00
Iron car axles	15.00 to	15.50
Iron and steel pipe (1 in. dia., not under 2 ft. long)	6.00 to	6.25
Forge fire		4.50
No. 1 railroad wrought		8.25
No. 1 yard wrought, long		7.25
Rails for rolling	6.25 to	6.75
Stove plate (foundry)	4.75 to	5.50
Malleable cast (railroad)	7.00 to	7.50
Cast borings (chemical)	8.00 to	8.50

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast	$11.00 to	$11.50
No. 1 hvy. cast (columns, bldg. materials, etc.; cupola size)	9.00 to	9.50
No. 2 cast (radiators, cast boilers, etc.)	8.00 to	8.50

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Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and struc. shapes	2.70c. to 3.10c.
Soft steel bars, small shapes	2.70c. to 3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.40c.
Flats and squares	3.90c.
Cold-roll. scrap, soft and quarter hard	4.95c.
Hoops	3.75c.
Bands	3.40c.
Hot-rolled sheets (No. 10)	3.00c. to 3.25c.
Hot-rolled ann'l'd sheets (No. 24*)	3.50c.
Galvanized sheets (No. 24*)	4.00c.
Long terne sheets (No. 24)	5.00c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, ½ x ½ in. and larger	3.40c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.75c.
Open-hearth spring steel, bases,	4.50c. to 7.00c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

	Per Cent Off List
Machine bolts, cut thread:	
¾ x 6 in. and smaller	65 to 65 and 10
1 x 30 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	65 to 65 and 10
¾ x 20 in. and smaller	65 to 65 and 10
Boiler Tubes:	**Per 100 Ft.**
Lap welded, 2-in.	$19.00
Seamless steel, 2-in.	20.25
Charcoal iron, 2-in.	26.25
Charcoal iron, 4-in.	67.00

July Sheet Production Gained, Orders Declined

Production of steel sheets by independent mills during July gained 27,000 tons over June and shipments increased 22,000 tons, according to the monthly report of the National Association of Flat Rolled Steel Manufacturers. Production was 174,890 tons, against 147,843 tons in June, and shipments were 178,460 tons, against 156,160 tons during the previous month. However, sales declined 19,000 tons to 144,461 tons and were the lowest since last November.

Increase in production and shipments was doubtless due in part to the bringing out of tonnage by the price advances that became effective July 1. Unfilled orders declined over 100,000 tons. The July report and comparisons in net tons follow:

	July	June	May
Sales	144,461	163,599	148,612
Production	174,890	147,843	201,846
Shipments	178,460	156,160	191,942
Unfilled orders	203,358	304,107	296,731
Unshipped orders	83,006	92,395	86,912
Unsold stocks	77,953	75,618	82,532
Capacity per month	558,850	543,400	527,900
Percentage reporting	67.6	67.6	67.6
Percentages, Based on Capacity			
Sales	38.2	44.5	41.7
Production	46.3	40.3	56.6
Shipments	47.2	42.5	53.8
Unfilled orders	53.8	82.8	83.2
Unshipped orders	22.0	25.2	24.4
Unsold stocks	20.6	20.6	23.1

PHILADELPHIA

Steel Orders Unusually Small—Navy Inquires for Destroyers

PHILADELPHIA, Aug. 17.—Steel buying is still limited to small lots for immediate needs, but the volume of this business continues fairly steady and mill operations are unchanged at slightly better than 30 per cent of capacity. With individual orders so small, there is little pressure for lower prices, and concessions appear only occasionally on the more desirable plate and shape tonnages. The new bases on sheets are being maintained on current business, which is mostly in lots of considerably under a carload. Fabricators are bidding on a number of small public projects and a few private enterprises.

An inquiry from the Navy Department for 11 destroyers requiring about 6000 tons of plates offers some prospective plate tonnage. The American Locomotive Co. is about to place a small tonnage of light plates for electric locomotives which it is building for the Pennsylvania Railroad.

PIG IRON

Foundry melt in this district is generally unchanged and buying is only for prompt or early shipment, seldom exceeding a carload of iron. A northern New York furnace continues to be a factor in pig iron sales in this district. Foundry iron ranges from $16 to $16.25 a ton, f.o.b. eastern Pennsylvania furnace, with stacks now out of blast maintaining the higher quotation, which is obtainable on small lots. Southern sellers are quoting $11 a ton, Birmingham furnace, or $16.25 a ton, on dock Philadelphia, but sales into this district are small. There has been no basic iron buying recently, and low phosphorus iron requirements are limited.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	$16.76 to $17.01
East. Pa. No. 2X, 2.25 to 2.75 sil.	17.26 to 17.51
East. Pa. No. 1X	17.76 to 18.01
Basic (del'd east. Pa.)	15.75
Malleable	19.00 to 20.00
Stand. low phos. (f.o.b. east. Pa. furnace)	23.00 to 24.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.04
Va. No. 2, 2.25 to 2.75 sil.	22.54

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to $1.64 from eastern Pennsylvania furnaces, $4.54 from Virginia furnaces.

STEEL BARS

Consumers continue to buy only in small lots for prompt shipment. The quotation is unchanged at 1.60c., Pittsburgh, or 1.89c., delivered Philadelphia. Billet steel reinforcing bars are quoted by distributers at 1.60c., Pittsburgh, or 1.89c., Philadelphia, for small lots, usually under a carload, and concessions of $1 and more a ton are occasionally granted on the larger projects. Only a small tonnage of foreign reinforcing bars has been sold in this district despite offers by importers at about $4 a ton under the usual domestic quotation. Rail steel bars are quoted at 1.20c. to 1.30c., Pittsburgh, or 1.49c. to 1.59c., Philadelphia. The largest reinforced concrete project in the market is the Federal warehouse in Washington, which calls for upward of 2500 tons of bars. An addition to the Easton, Pa., plant of the Individual Drinking Cup Co. will require 100 to 125 tons of bars.

SHAPES

Fabricators are bidding on small projects, including a high school in Pottsville, Pa., calling for about 200 tons, and a building at Byberry, Pa., for the Philadelphia Institution for the Feeble Minded. Shape prices are generally unchanged at 1.70c. a lb., f.o.b. nearest mill to consumer, or 1.76c., Philadelphia, with concessions of $1 a ton on the more desirable specifications.

PLATES

Orders are small, ranging as a rule from a carload lot down to about one ton of plates for prompt shipment. On such business, quotations range from 1.70c. to 1.75c., Coatesville, Pa., or 1.80½c. to 1.85½c., Philadelphia. On the sizable projects, requiring in excess of one or two carloads, a concession of $1 a ton is occasionally granted.

SHEETS

Consumers are maintaining recent operating rates in most cases, but are buying only small lots of sheets for immediate requirements. In certain cases, consumers still have sufficient supplies of sheets bought prior to July 1, when the new price schedule became effective. Automobile body manufacturers are moderately active, but the radio industry is still at a low level of production.

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.50c.
Structural shapes	2.50c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforc. steel bars, sq. twisted and deform.	2.30c.
Cold-fin. steel, rounds and hex.	3.40c.
Cold-fin. steel, sq. and flats	3.90c.
Steel hoops	3.15c.
Steel bands, No. 12 to ⅞-in. inclu.	2.90c.
Spring steel	5.00c.
Hot rolled, box annealed sheets (No. 24)	3.55c.
Galvanized sheets (No. 24)	4.00c.
Hot rolled blue annealed sheets (No. 10)	3.05c.
Diam. pat. floor plates, ¼-in.	5.20c.
Swedish iron bars	6.60c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

IMPORTS

In the week ended Aug. 15, the only arrival at this port of interest to the iron or steel industry was five tons of manganese ore from Germany.

OLD MATERIAL

Transactions in scrap are almost entirely confined to distress carloads. Consumers evidently have sufficient supplies for the present. The mill at Coatesville, Pa., has held up deliveries of No. 1 heavy melting steel temporarily. This grade is still being delivered on contracts to a consumer at Claymont, Del., and small tonnages of machine shop turnings and No. 2 steel are being shipped to Phoenixville, Pa. Otherwise the market is quiet and prices lack strength.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	$8.25 to $9.25
No. 2 heavy melting steel	7.00
No. 1 railroad wrought	10.00 to 10.50
Bundled sheets (for steel works)	6.50
Hydraulic compressed, new	7.00 to 8.00
Hydraulic compressed, old	6.00 to 7.00
Machine shop turnings (for steel works)	5.00 to 6.00
Heavy axle turnings (or equiv.)	8.00 to 8.50
Cast borings (for steel works and roll. mill)	5.00 to 6.00
Heavy breakable cast (for steel works)	10.50
Railroad grate bars	7.75
Stove plate (for steel works)	7.75
No. 1 low phos., hvy. (0.04% and under)	12.00 to 13.00
Couplers and knuckles	11.00
Rolled steel wheels	11.00
No. 1 blast furnace	5.50
Wrot. iron and soft steel pipe and tubes (new specific.)	10.50 to 11.00
Shafting	16.50
Steel axles	16.00 to 16.50
No. 1 forge fire	8.00 to 8.50
Cast iron carwheels	12.00 to 12.50
No. 1 cast	11.00 to 11.50
Cast borings (for chem. plant)	11.50 to 12.00
Steel rails for rolling	10.50 to 11.00

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Worthington Pump Buys Metalweld, Inc.

The Worthington Pump & Machinery Corpn. has bought Metalweld, Inc., Philadelphia, builder of portable compresser units. Having acquired a year ago the Gilman line of rock drills and accessories, the Worthington company has now rounded out its products so that it will be able to supply all air equipment requirements of contractors, railroads, utilities and industrial users. The Metalweld portable compressors will be manufactured at the Harrison, N. J., works of Worthington, and the engineering, production and sales personnel of the Metalweld organization will also be located there.

BOSTON

Business in All Lines Quiet, with Pig Iron Sales Less Than 600 Tons

BOSTON, Aug. 18.—Business in iron and steel and all allied lines was very quiet the past week. Pig iron sales did not reach 600 tons, one of the smallest weeks on record for this territory. They included small lots of charcoal iron at $22 to $24 a ton, furnace, or $30.19 to $32.19 a ton, delivered. There are no open inquiries of size in the market, but one of the largest consumers is sounding out prices without specifying any tonnage. Specifications against contracts were limited, indicating no increase in the New England melt. Furnace representatives say the credit situation has improved this month.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25..	$19.91
*Buffalo, sil. 2.25 to 2.75..	19.91
†Buffalo, sil. 1.75 to 2.25..	19.28
†Buffalo, sil. 2.25 to 2.75..	19.28
*Ala., sil. 1.75 to 2.25.....$20.11 to	20.61
*Ala., sil. 2.25 to 2.75..... 20.61 to	21.11
†Ala., sil. 1.75 to 2.25.....	16.75
†Ala., sil. 2.25 to 2.75.....	17.25

Freight rates: $4.91 all rail and $4.28 rail and water from Buffalo; $9.61 all rail from Alabama and $5.75 rail and water from Alabama to New England seaboard.
*All rail rate.
†Rail and water rate.

CAST IRON PIPE

Hartford, Conn., has awarded 1600 tons of 6 to 16-in. cement-lined pipe to the American Cast Iron Pipe Co., and Medfield, Mass., placed 1940 tons of 6 to 16 in. with the United States Pipe & Foundry Co. Little new business is in view. The Warren Foundry & Pipe Co. received specifications for more than 1000 tons of pipe against contracts placed earlier in the year.

REINFORCING STEEL

Sales for the week did not exceed 300 tons, and included 100 tons for a local building and the remainder in dribbling lots. Prices made on small tonnages from stock are steady, but there is irregularity on the larger lots. Prices on billet bars from stock are: One to 5-ton lots, 3c. a lb., base; 6 to 99-ton lots, 2.40c.; 100-ton lots and larger, 2.30c. Rail steel bars are 2.26½c. a lb., Boston rate points.

OLD MATERIAL

The market continues in the doldrums. Little, if any, material is moving out of dealers' yards, business being confined to scattered cars of No. 1 heavy melting steel and borings and turnings on direct shipment from manufacturing plants. Quotations on most items are nominal.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel..	$4.50 to	$5.00
Scrap T rails	4.00 to	4.50
Scrap girder rails.....	3.00 to	3.50
No. 1 railroad wrought...	7.00 to	7.50
Machine shop turnings....	1.25 to	1.80
Cast iron borings (steel works and rolling mill)	1.50 to	1.75
Bundled skeleton, long...	3.00 to	3.25
Forged flashings.....	5.00 to	5.25
Blast furnace borings and turnings	1.50 to	1.75
Forge scrap	0.50 to	0.80
Shafting	10.00 to	10.50
Steel car axles	11.00 to	12.00
Wrought pipe, 1 in. in diameter (over 2 ft. long)	5.00 to	5.25
Rails for rolling.....	7.50 to	8.00
Cast iron borings, chemical	7.00 to	7.25
No. 2 cast.....	5.00 to	5.25

Prices per gross ton deliv'd consumers' yards:

Textile cast	$9.50 to	$10.00
No. 1 machinery cast.....	9.50 to	10.00
Stove plate	5.00 to	5.25
Railroad malleable	13.00 to	13.50

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.36½c.
Structural shapes—	
Angles and beams	3.36½c.
Tees	3.36½c.
Zees	3.36½c.
Soft steel bars, small shapes	3.26½c.
Reinforcing bars	3.11½c. to 3.26½c.
Iron bars—	
Refined	3.26½c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tire steel	4.50c. to 5.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex	3.50c. to 5.50c.
Squares and flats	4.00c. to 6.00c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.80c.

	Per Cent Off List
Machine bolts	65 and 5
Carriage bolts	65 and 5
Lag screws	65 and 5
Hot-pressed nuts	40 and 10
Cold-punched nuts	40 and 10
Stove bolts	70 and 10

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CINCINNATI

Moderate Improvement in Pig Iron Sales and Inquiries

CINCINNATI, Aug. 18.—With an increase in bookings and a larger volume of small inquiries, pig iron sales representatives believe that the market outlook is better. Sales last week were about 2500 tons, of which 500 tons of Northern foundry iron was placed by a south central Ohio consumer. Current inquiries, while in better number than heretofore, are all small. The Northern iron market is in an uncertain condition due to the price concessions brought about by keen competition both from furnaces ordinarily in this district and others that have sought business hereabouts in the last two months. Southern iron, while not featured very prominently in current business, is steady as to quotations.

Prices per gross ton, deliv'd Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	$14.69
Ala. fdy., sil. 2.25 to 2.75	15.19
Tenn. fdy., sil. 1.75 to 2.25	14.69
S'th'n Ohio silvery, 8 per cent	23.89

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.69 from Birmingham.

FINISHED STEEL

An improvement in the automotive demand during the last week brought the level of sheet demand a trifle above that of the preceding two weeks. Current business, outside of the automotive field, is fairly well divided among the various sheet consuming industries, but, of course, the present slow rate of production of automobile plants is affecting the demand from that source. Prices are steady. Production last week was under 40 per cent, but it is expected that the slight improvement in orders will bring the schedules this week closer to the 40 per cent level.

OLD MATERIAL

Scrap iron dealers and consumers are marking time. Small amounts of scrap are going forward on old commitments and an occasional small order is reported. The recent Louisville & Nashville list is reported to have brought better prices.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel.....	$7.25 to	$7.75
Scrap rails for melting...	10.25 to	10.75
Loose sheet clippings.....	3.50 to	4.00
Bundled sheets	6.75 to	7.25
Cast iron borings	3.75 to	4.25
Machine shop turnings....	4.00 to	4.50
No. 1 busheling.....	5.75 to	6.25
No. 2 busheling.....	3.75 to	4.25
Rails for rolling	11.00 to	11.50
No. 1 locomotive tires....	9.50 to	10.00
No. 2 railroad wrought...	7.25 to	7.75
Short rails	13.00 to	13.50
Cast iron carwheels	10.50 to	11.00
No. 1 machinery cast.....	12.50 to	13.00
No. 1 railroad cast.....	11.50 to	12.00
Burnt cast	5.25 to	5.75
Stove plate	5.25 to	5.75
Brake shoes.....	5.25 to	5.75
Agricultural malleable....	10.00 to	10.50
Railroad malleable.....	11.00 to	11.50

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Follansbee Brothers Co., Pittsburgh, in the six months ended June 30 had net loss after depreciation and interest of $398,687, compared with a net profit of $4,353 in the first six months of 1930.

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
New billet reinforc. bars	3.00c.
Rail steel reinforc. bars	3.00c.
Hoops	3.90c.
Bands	3.20c.
Cold-fin. rounds and hex	3.50c.
Squares	4.00c.
Hot-rolled annealed sheets (No. 24)	3.75c.
Galv. sheets (No. 24)	4.25c.
Hot-rolled sheets (No. 10)	3.30c.
Structural rivets	4.20c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg (25 kegs or more)	2.95
Cement c't'd nails, base 100 lb. keg	2.95
Chain, per 100 lb.	10.25

	Net per 100 Ft.
Lap-welded steel boiler tubes, 2-in.,	$16.50
4-in.	34.50
Seamless steel boiler tubes, 2-in.	17.50
4-in.	36.00

BUFFALO

Blast Furnace Banked—Ingot Output Reduced—One Steel Plant Idle

BUFFALO, Aug. 18.—One blast furnace has been banked in this district, leaving four in operation. The period of idleness of this unit is somewhat indefinite. Pig iron demand continues very low, although small-lot sales have shown some improvement during the past week. Buffalo producers continue to find it extremely difficult to meet seaboard competition on the larger tonnages. Of perhaps 1000 tons of Eastern inquiry recently before Buffalo district sellers, less than 20 per cent has come to local furnaces. District producers have quoted $15.50 or less on the more desirable inquiries. The district price remains firm at $17. Two inquiries of 300 tons each are listed as still pending, with several of smaller size likely to be closed this week.

Prices per gross ton f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	$17.00
No. 2X fdy., sil. 2.25 to 2.75	17.50
No. 1 fdy., sil. 2.75 to 3.25	18.50
Malleable, sil. up to 2.25	17.50
Basic	17.00
Lake Superior charcoal	25.28

FINISHED STEEL

Operation in the Buffalo district dropped this week to about 27 per cent, the lowest point that has been reached in several years, in a period in which there were no holidays. Only 10 open-hearths were in operation on Monday, and there was no prospect of an increase before the end of the week. The complete shutdown of the Buffalo branch of the Republic Steel Corpn. has been responsible for this condition. Finishing mill schedules were curtailed in some of the other plants. No important inquiry for structural steel or reinforcing bars was reported in the district this week. Steel executives believe that little improvement in the output of finished steel is to be expected here until after Labor Day, although it is likely that the Republic plant will operate alternate weeks.

OLD MATERIAL

Distributers report inability to purchase scrap at prices that will enable them to make sales to customers at the prevailing nominal quotations. This situation has produced a complete suspension of operations in several of the larger yards in the Buffalo district. The trade is convinced that tonnage buyers cannot make purchases at prevailing offers, and it is looking for an upward trend in prices when reduction of supplies in the possession of melters force purchases. The price list now quoted is nominal. No sales of any material have been reported during the past week.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:		
No. 1 heavy melting steel		$9.00
No. 2 heavy melting scrap		7.50
Scrap rails	$10.00 to	10.50
Hydraul. comp. sheets		7.50
No. 2 hydraul. comp. sheets		7.00
Hand bundled sheets		7.00
Drop forge flashings		7.50
No. 1 busheling		7.50
Hvy. steel axle turnings	8.50 to	9.50
Machine shop turnings	4.50 to	5.00
No. 1 railroad wrought	7.50 to	8.00
Acid Open-Hearth Grades:		
Knuckles and couplers	11.00 to	11.50
Coil and leaf springs	11.00 to	11.50
Rolled steel wheels	11.00 to	11.50
Low phos. billet and bloom ends	13.00 to	14.00
Electric Furnace Grades:		
Short shov. steel turnings	6.00 to	6.50
Blast Furnace Grades:		
Short mixed borings and turnings	6.00 to	6.50
Cast iron borings	6.00 to	6.50
No. 2 busheling	4.50 to	5.00
Rolling Mill Grades:		
Steel car axles	15.00 to	15.50
Iron axles	16.00 to	16.50
Cupola Grades:		
No. 1 machinery cast	9.75 to	10.00
Stove plate	8.00 to	8.25
Locomotive grate bars	7.00 to	7.50
Steel rails, 3 ft. and under	13.00 to	13.50
Cast iron carwheels	11.50 to	12.00
Malleable Grades:		
Industrial	10.00 to	10.50
Railroad	10.00 to	10.50
Agricultural	10.00 to	10.50
Special Grades:		
Chemical borings	9.00 to	9.50

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes	3.25c.
Soft steel bars	3.00c.
Reinforcing bars	2.65c.
Cold-fin. flats and sq.	3.65c.
Rounds and hex.	3.15c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	3.70c.
Galv. sheets (No. 24)	4.10c.
Bands	3.35c.
Hoops	3.90c.
Hot-rolled sheets (No. 10)	3.50c.
Com. wire nails, base per keg	$2.45
Black wire, base per 100 lb.	3.20

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YOUNGSTOWN

Next Two Weeks Expected to Bring Some Gain in Steel Orders

YOUNGSTOWN, Aug. 17.—With the exception of the placing of additional line pipe tonnage with Youngstown mills during the past week, steel activity in the Valleys has shown little change from July. Current specifications are even lighter in the opinion of some producers. Although evidences of an upturn are almost entirely lacking, makers of steel generally expect a change for the better to make itself felt in the next two weeks.

Although shipments of finished steel products to the automobile industry are by no means entirely suspended, many of the larger customers of Youngstown district mills are taking in no material, shipments during the last two weeks having been the lightest of the year. Strip steel particularly is affected adversely, and full finished sheets are very quiet. Sheet releases in general have been especially light in the last week, as most consumers took sufficient material during July to carry them through August at the current low rate of consumer operations.

While two Valley producers shared in the recent order of the Texas Empire Pipe Line Co. for 27,000 tons of electrically welded pipe, the exact distribution figures have not been made public. A number of smaller pipe orders, ranging up to 1000 tons in size, have been placed during the month, and electric weld mills in the district are assured of a steady operation until well in September. Some additional prospective tonnage is also coming out, and this division of the steel industry will certainly maintain its present status until general demand receives seasonal impetus during September. Lapweld mills are idle most of the time, and buttweld capacity is engaged at about 25 per cent.

The price structure in the Youngstown district seems to be better established than it has been since the beginning of the depression two years ago. While producers admit that current quotations are not being tested on large tonnage buying, small lots of all products invariably bring the full market prices. This is particularly true in the case of sheets, and mills report a little forward contracting at the new price levels. Hot-rolled strip is also well maintained, and bars and plates reflect no deviations from the 1.60c., Pittsburgh, price. Small lots of nails and other merchant wire products are also bringing the full market prices, and line pipe quotations are much better maintained than they were in the spring and early summer.

Steel ingot production in the Valleys thus far in the month has averaged about 35 per cent of capacity, with the level slightly higher last week. With some curtailment in prospect for the present week, the month is expected to end at about this same rate, although an increase in buying might change the picture very suddenly. Sheet production averages about 35 per cent, with strip considerably lower. Tin mill operations averaged slightly over 50 per cent. Pig iron output will be boosted this week by the resumption of one of the Hubbard furnaces of the Youngstown Sheet & Tube Co., which has been banked.

The raw materials market is rather quiet, with mill buying of scrap at a standstill. Although dealers find buying prices somewhat lower on distress lots, scrap is still rather scarce, and, with increased open-hearth activity in sight, no further weakening is expected. Pig iron is particularly dull, and sellers are not aggressive in seeking orders. Transactions in semi-finished steel are limited to occasional small lots, which are bringing $29 a ton, Youngstown.

PACIFIC COAST

Foreign Steel Continues to Disturb Domestic Market Conditions

SAN FRANCISCO, Aug. 17.—For the first seven months of the year the total consumption of steel in the Pacific Coast area was probably 50 per cent of last year's demand in the same period, according to an authoritative estimate, and yet the tonnage of finished steel imported has been greater than a year ago. The consequent disruption of prices and loss of volume continue to be a grave problem in this market.

Lettings increased for the week, yet new inquiries were almost nil for the second consecutive week. The California State Highway Commission announced a program of contemplated bridge construction for the remainder of the year, totaling an estimated $1,028,500, to be advertised for bids later. The Metropolitan Water District of Southern California will vote Sept. 29 on a $220,000,000 bond issue for the Colorado River aqueduct, using the 265-mile Parker route. The estimated steel requirements for siphons, penstocks and delivery lines in that project total $4,256,000.

BARS

Public lettings totaled 1850 tons for large contracts and some 1600 tons of new inquiries were entered. In addition, the general contract for a reinforced concrete pile mole at the Fish Harbor extension, involving 1200 tons, was awarded by the Los Angeles City Harbor Commission to Merritt, Chapman & Scott and Pan-Pacific Piling Construction Co. Carload prices ex-warehouse remain at 2.65c., base, at San Francisco, and 2.50c., base, at Los Angeles.

PLATES

The city of Los Angeles opened bids for 60 and 72-in. welded steel pipe involving nearly 1000 tons of plates. The Huber Co., Los Angeles, was low bidder on 100 tons for a tank at the County General Hospital. The semi-annual financial report of Western Pipe & Steel Co. reflected the recent activity of this company in its pipe fabricating department, now in the midst of contracts for a 47-mile riveted pipe line across the San Joaquin Valley for the city of San Francisco at its northern plant and a 78-mile natural gas line of 26-in. automatic welded steel pipe from Kettleman Hills to Long Beach for the Southern Fuel Co., being fabricated at the company's Los Angeles plant.

SHAPES

Public lettings of slightly over 1000 tons were announced, covering larger contracts, yet practically no new inquiries or plans for figuring were received.

CAST IRON PIPE

R. D. Wood & Co. took 207 tons of 20-in. Class 250 pipe at San Bernardino, and John Artukovich was awarded 174 tons of 6 to 12-in. for Artesia, Los Angeles County. About 3000 tons is pending. No public new inquiry has been entered during the week.

STEEL PIPE

Smith, Booth, Usher Co. of Los Angeles was awarded 139 tons of 2 and 4-in. pipe for Ontario. American Concrete & Steel Pipe Co. took a $50,000 contract from the Union Oil Co. for 100 000 ft. of reconditioned small size pipe.

F.O.B. Warehouse Prices

(Less than 5000 Lb.)

	Base per Lb.		
	San Francisco	Los Angeles	Seattle
Plates and struc. shapes, ¼-in. and heavier	2.80c.	3.00c.	2.40c.
Soft steel bars	2.80c.	3.00c.	2.40c.
Reinforcing bars	2.80c.	2.80c.	3.00c.
Hot-rolled annealed sheets (No. 24)	3.90c.	4.00c.	3.50c.
Hot-rolled sheets (No. 10)	3.40c.	3.50c.	3.00c.
Galv. sheets (No. 24)	4.40c.	4.20c.	3.85c.
Struc. rivets, ⅜ in. and larger, less than 1000 lb.	5.00c.	5.00c.	5.50c.
Special nails; common 4 to 60d; smooth box 4 to 20d; finish 6 and 8d; base per keg	$2.55	$2.45	$2.40
Other wire nails, base per keg	2.80	2.70	2.65
Cement c't'd nails, 100-lb. keg	2.65	2.70	2.65

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BIRMINGHAM

Open-Hearth Operations at Ensley Mill Discontinued

BIRMINGHAM, Aug. 18.—Pig iron shipments this month are slightly ahead of those for the same period in July, but the general tone of the market is no better, with buying conditions, operations and quotations unchanged. New business is uncertain from day to day and made up almost entirely of carload orders for prompt shipment. Prevailing quotations for district iron are now largely based on $12. Furnace operations are the same as for several weeks, with 10 furnaces active, six of which are on foundry. There is a possibility of another furnace going out during the present week, but this has not been definitely decided.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil	$12.00
No. 1 fdy., 2.25 to 2.75 sil	12.50
Basic	12.00

FINISHED STEEL

There was a slight recession in the volume of new tonnage booked last week, and demand was more or less spotty as compared with the even rate for some weeks past. Open-hearth operations are being further reduced. On Saturday, the Tennessee company completely stopped open-hearth operations at its Ensley works, where for the past two weeks four furnaces had been in operation. Open-hearth operations at Fairfield, which have been four to five furnaces, will continue without change for the time being. Gulf States Steel, operating three furnaces for the past several weeks, will shortly reduce to two.

Nashville Bridge Co. has secured orders totaling 2380 tons of structural steel for two State highway bridges in Louisiana. Other structural steel orders of the past week were for small quantities. Reinforcing bar orders are likewise small and irregular. There is considerable interest in the district in the New Orleans bridge project, bids for which are to be opened Aug. 27. This bridge, with approaches, will require approximately 70,000 tons of steel. About 1500 tons of bars will be placed at an early date for the new Memphis waterworks pumping station. Plans for the remodeling of the Louisville & Nashville trainshed at Birmingham were released last week; about 250 tons of structural steel will be needed.

CAST IRON PIPE

Current bookings continue to be disappointing and do not provide a very substantial volume of forward tonnage. Orders are scattered and usually small. Operations are being maintained at 40 to 50 per cent.

OLD MATERIAL

Shipments of steel grades, on business already booked, were better last week, but new business is quiet. Prices are unchanged.

Prices per gross ton deliv'd Birmingham dist. consumers' yards:

Heavy melting steel	$8.50 to	$9.00
Scrap steel rails		8.50
Short shoveling turnings		6.50
Cast iron borings	(No market)	
Stove plate		7.00
Steel axles	15.00 to	16.00
Iron axles		18.00
No. 1 railroad wrought		8.00
Rails for rolling	11.50 to	12.00
No. 1 cast		9.00
Tramcar wheels	10.00 to	10.25
Cast iron borings, chem.		13.50

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The Simplex Tool Co., Woonsocket, R. I., has been taken over by the Simplex Corpn., which will continue manufacture of the machinists', coachmaker's and combination pipe vises, as well as the new production foot-operated and the utility line of home and garage vises made by the older company. There will be no change in personnel nor in plant.

ST. LOUIS

Stove Foundries Beginning to Buy Pig Iron, But in Small Quantities

ST. LOUIS, Aug. 18.—Buying of pig iron consists almost entirely of spot business, orders from a carload up to 100 tons. The stove interests are beginning to buy, but only in small quantities. Implement foundries are showing very little life, and the melters of basic iron in the district still report dull business. Pig iron makers report that prices are firm. Melters are taking pig iron according to contracted schedules. Stocks of raw materials in hands of melters are said to be low.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., deliv'd St. Louis	19.66
Southern No. 2 fdy., deliv'd	15.42
Northern malleable, deliv'd	19.66
Northern basic, deliv'd	19.66

Freight rates: 75c. (average) Granite City to St. Louis; $2.16 from Chicago; $4.42 from Birmingham.

FINISHED STEEL

Orders being received by the Granite City Steel Co. are about at the same rate as in July, no large tonnage being involved and the total being composed of many orders calling for small requirements. The market for sheets continues firm, and sales are being made at the full published figures. There has been a slackening in the demand for tin plate, which was not unlooked for.

Warehouse business is only fair, although some nice business was placed during the last week, which was regarded as encouraging. Business from the oil fields amounts almost to nothing.

The Laclede Steel Co. was awarded 330 tons of reinforcing bars for the superstructure for the Post Office at Louisville, Ky.

OLD MATERIAL

The market for old material continues at low ebb. Mills in the district are buying very little. Further price declines are reported. No. 1 locomotive tires, steel rails, less than 3 ft., and railroad malleable are 50c. a ton off.

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
Cold-fin. rounds, shafting, screw stock	3.35c.
Hot-rolled annealed sheets (No. 24)	3.80c.
Galv. sheets (No. 24)	4.35c.
Hot-rolled sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	3.85c.
Galv. corrug. sheets	4.40c.
Structural rivets	4.15c.
Boiler rivets	4.15c.
	Per Cent Off List
Tank rivets, 7/8-in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	60 and 10
Carriage bolts	60 and 10
Lag screws	60 and 10
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	60 and 10
Less than 200 lb.	50 and 10
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	60 and 10
Less than 200 lb.	50 and 10

Railroad lists: Southern Pacific, 7180 tons; Louisville & Nashville, 5600 tons; Wabash, 1575 tons; Chicago & Alton, 590 tons.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

Selected heavy melting steel	$8.00 to	$8.25
No. 1 heavy melting or shoveling steel	7.75 to	8.25
No. 2 heavy melting or shoveling steel	7.00 to	7.50
No. 1 locomotive tires	10.00 to	10.50
Misc. stand.-sec. rails including frogs, switches and guards, cut apart	8.75 to	9.25
Railroad springs	9.25 to	9.75
Bundled sheets	5.00 to	5.50
No. 2 railroad wrought	7.75 to	8.25
No. 1 busheling	6.00 to	6.50
Cast iron borings and shoveling turnings	5.50 to	6.00
Iron rails	8.00 to	8.50
Rails for rolling	10.50 to	11.00
Machine shop turnings	3.00 to	3.50
Heavy turnings	6.50 to	7.00
Steel car axles	11.50 to	12.00
Iron car axles	15.00 to	15.50
Wrot. iron bars and trans.	8.25 to	8.75
No. 1 railroad wrought	5.00 to	5.50
Steel rails, less than 3 ft.	11.50 to	12.00
Steel angle bars	8.00 to	8.50
Cast iron carwheels	7.25 to	7.75
No. 1 machinery cast	8.50 to	9.00
Railroad malleable	7.00 to	7.50
No. 1 railroad cast	7.50 to	8.00
Stove plate	7.00 to	7.50
Relay. rails, 60 lb. and under	16.00 to	16.50
Relay. rails, 70 lb. and over	20.00 to	21.00
Agricult. malleable	6.75 to	7.25

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CANADA

Canadian Pacific Orders 6000 Tons of Rails

TORONTO, Aug. 17.—While there is little in the way of actual improvement in the Canadian iron and steel industry, a few bright spots have developed within the past week or 10 days. The $22,000,000 power project at the Abitibi Canyon for the Abitibi Power & Paper Co. will give some stimulus to industry, and several companies have already benefited by large contracts for this work. The Dominion Steel & Coal Co., Sydney, N. S., has closed a contract with the Canadian Pacific Railway Co. for 6500 tons of 100-lb. rails for delivery next year. Other rail business is expected both from the Canadian Pacific and Canadian National railways. The Dominion Bridge Co., Vancouver, B. C., has received a contract to supply steel of the value of $162,000 for the 300-ft. span for the Second Narrows bridge at Vancouver.

PIG IRON

Merchant iron sales developed a slight spurt of activity during the week, when the total ran slightly over 500 tons. Spot buying continues in single car lots, with occasional orders appearing for 100 to 200 tons. Prices are unchanged.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$24.00
No. 2 fdy. sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	20.50

OLD MATERIAL

Sales in the week were mostly of machinery cast and malleable scrap in lots under 100 tons, but there has been some improvement in inquiry. Steel mills are showing no interest in the market.

Dealers' buying prices for old material:
Per Gross Ton

	Toronto	Montreal
Heavy melting steel	$7.00	$6.00
Rails, scrap	7.00	6.00
No. 1 wrought	6.00	8.00
Machine shop turnings	2.00	2.00
Boiler plate	5.00	4.50
Heavy axle turnings	2.50	2.50
Cast borings	2.00	2.00
Steel borings	2.00	2.00
Wrought pipe	2.00	2.00
Steel axles	7.00	9.00
Axles, wrought iron	7.00	11.00
No. 1 machinery cast		10.00
Stove plate		8.00
Standard carwheels		8.50
Malleable		8.00
Per Net Ton		
No. 1 machinery cast	11.00	
Stove plate	9.00	
Standard carwheels	10.00	
Malleable scrap	9.00	

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Detroit Scrap Market Shows Some Weakness

DETROIT, Aug. 18.—The market on old material has shown some evidences of further weakness in the past week, due no doubt to fact that shipments have been held up. Some mill buying is anticipated in the very near future, which should give the market some strength.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel	$6.75 to	$7.25
Borings and short turnings	4.50 to	5.00
Long turnings	4.00 to	4.50
No. 1 machinery cast	8.00 to	8.50
Automotive cast	11.00 to	11.50
Hydraul. comp. sheets	6.75 to	7.25
Stove plate	5.25 to	5.75
New No. 1 busheling	5.25 to	5.75
Old No. 2 busheling	2.50 to	3.00
Sheet clippings	4.00 to	4.50
Flashings	5.50 to	6.00

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Pratt & Whitney Co. Denies Merger Report

C. R. Burt, president, Pratt & Whitney Co., Hartford, Conn., informs THE IRON AGE that there is no truth in reports that have gained wide circulation that a merger of the Pratt & Whitney Co. and the Brown & Sharpe Mfg. Co. is being negotiated.

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Gulf States Steel Co. has opened a district office in Greensboro, N. C., to serve Virginia, North Carolina and South Carolina. The office is in charge of S. D. Yardley, formerly in the sales promotion department in Birmingham.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

MILL PRICES OF SEMI-FINISHED STEEL

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	$29.00
Rerolling, 4-in. and under 10-in., Youngstown	29.00
Rerolling, 4-in. and under 10-in., Cleveland	29.00
Rerolling, 4-in. and under 10-in., Chicago	31.00
Forging quality, Pittsburgh	35.00

Sheet Bars

(Open-Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$29.00
Youngstown	29.00
Cleveland	29.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$29.00
Youngstown	29.00
Cleveland	29.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.60c.
Universal	1.60c.
Sheared	1.60c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$35.00
Cleveland	35.00
Chicago	36.00

PRICES OF RAW MATERIAL

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron, dry, Spanish or Algerian	8c. to 9c.
Iron ore, low phos., Swedish, average 68% iron	10.00c.
Iron ore, basic or foundry, Swedish, average 65% iron	9.00c.
Iron ore, basic and foundry, Russian, average 63% iron	9.00c.
Manganese ore, washed 52% manganese, from the Caucasus	25c. to 27c.
Manganese ore, African or Indian, 50 to 52%	24c. to 26c.
Manganese ore, Brazilian, 46 to 48%	22c. to 24c.
Tungsten ore, high grade, per unit, in 60% concentrates	$12.00 to $12.50

	Per Gross Ton
Chrome ore, 45% Cr_2O_3 crude, c.i.f. Atlantic seaboard	$20.00
Chrome ore, 48% Cr_2O_3 crude, c.i.f. Atlantic seaboard	22.50

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	$2.40
Foundry, f.o.b. Connellsville prompt	$3.25 to 4.50
Foundry, by-product, Ch'go ovens	7.50
Foundry, by-product, New England, del'd	10.50
Foundry, by-product, Newark or Jersey City, delivered	8.70 to 9.10
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.40 to $1.50
Mine run coking coal, f.o.b. W. Pa.	1.50 to 1.60
Gas coal, ¾-in., f.o.b. Pa. mines	1.70 to 1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	.60 to .90
Gas slack, f.o.b. W. Pa. mines	.60 to .90

Ferromanganese

	Per Gross Ton
Domestic, 80¾, seaboard	*$80.00 to $85.00
Foreign, 80%, Atlantic or Gulf port, duty paid	*80.00 to 85.00

*Minimum price quoted for lots of 2000 tons or more.

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$28.00 to $30.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	$83.50
75%	130.00

	Per Gross Ton Furnace		Per Gross Ton Furnace
10%	$35.00	12%	$39.00
11%	37.00	14 to 16%	31.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

	Per Gross Ton		Per Gross Ton
10%	$25.00	13%	$29.00
11%	26.00	14%	31.00
12%	27.00	15%	33.00

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

	Per Gross Ton		Per Gross Ton
6%	$19.00 to $21.00	11%	$22.00 to $24.00
7%	19.50 to 21.50	12%	23.00 to 25.00
8%	20.00 to 22.00	13%	25.00 to 27.00
9%	20.50 to 22.50	14%	27.00 to 29.00
10%	21.00 to 23.00	15%	29.00 to 31.00

Delivered prices at Chicago are about 50c. a ton below this schedule.

Other Ferroalloys

Ferrotungsten, per lb. contained metal del'd, carloads	$1.08
Ferrotungsten, less carloads	$1.15 to 1.25
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrochromium, 2% carbon	17.00c. to 17.50c.
Ferrochromium, 1% carbon	19.00c. to 20.00c.
Ferrochromium, 0.10% carbon	24.50c. to 26.00c.
Ferrochromium, 0.06% carbon	26.50c. to 28.00c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace	$3.15 to $3.65
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton	91.00
Ferromolybdenum, per lb. contained Mo., delivered	1.00
Calcium molybdate, per lb. contained Mo., delivered	85c.
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton	$122.50
Silico spiegel, per ton, f.o.b. furnace, car lots	42.50
Ton lots or less, per ton	47.50
Silico-manganese, gross ton, delivered: 2.50% carbon grade	105.00
1% carbon grade	115.00
Spot prices	$5 a ton higher

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	$13.00
No. 2 lump, Illinois and Kentucky mines	17.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	17.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick

	Per 1000 f.o.b. Works	
	High-Heat Duty Brick	Intermediate Heavy Duty Brick
Pennsylvania	$40.00 to $43.00	$32.00 to $35.00
Maryland	40.00 to 43.00	32.00 to 35.00
New Jersey	40.00 to 43.00	.....
Ohio	40.00 to 43.00	32.00 to 35.00
Kentucky	40.00 to 43.00	32.00 to 35.00
Missouri	40.00 to 43.00	32.00 to 35.00
Illinois	40.00 to 43.00	32.00 to 35.00
Ground fire clay, per ton	6.50	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$45.00
Chicago	49.00
Birmingham	47.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00

Chrome Brick

	Per Net Ton
Standard size	$45.00

MILL PRICES OF BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
†Machine bolts	73 and 10
†Carriage bolts	73 and 10
Lag bolts	73 and 10
Plow bolts, Nos. 1, 2, 3 and 7 heads	73 and 10
Hot-pressed nuts, blank or tapped, square,	73 and 10
Hot-pressed nuts, blank or tapped, hexagons,	73 and 10
C.p.c. and t. square or hex. nuts, blank or tapped	73 and 10
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.

†Bolts with rolled thread up to and including ⅝ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagons nuts	73 and 10
Semi-finished hexagons castellated nuts, S.A.E.,	73 and 10
Stove bolts in packages, P'gh.	80, 10, 10, 10 and 5
Stove bolts in packages, Ch'go.	80, 10, 10, 10 and 5
Stove bolts in pkgs., Cleveland.	80, 10, 10, 10 and 5
Stove bolts in bulk, P'gh.	80, 10, 10, 10, 5 and 2½
Stove bolts in bulk, Ch'go.	80, 10, 10, 10, 5 and 2½
Stove bolts in bulk, Cleveland,	80, 10, 10, 10, 5 and 2½
Tire bolts	60, 10 and 10

Discounts of 73 and 10 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.75
F.o.b. Chicago	2.85

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened,	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S.S. thread,	85 and 10
Upset hex. cap screws, S.A.E. thread	85 and 10
Upset set screws	80, 10 and 5
Milled studs	70

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.89c.
Del'd New York	1.93c.
F.o.b. Cleveland	1.65c.
F.o.b. Lackawanna	1.70c.
F.o.b. Birmingham	1.70c.
C.i.f. Pacific ports	2.00c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.	1.60c.
F.o.b. Birmingham, mill lengths	1.75c.
F.o.b. Cleveland	1.55c. to 1.60c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.30c. to 1.35c.
F.o.b. Chicago Heights mill	1.60c.
Del'd Philadelphia	1.49c. to 1.59c.

Iron

Common iron, f.o.b. Chicago	1.70c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.09c.
Common iron, del'd New York	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.70c.
Del'd Cleveland	1.78½c.
Del'd Philadelphia	1.80½c.
F.o.b. Coatesville	1.70c.
F.o.b. Sparrows Point	1.70c.
F.o.b. Lackawanna	1.70c.
Del'd New York	1.88c.
C.i.f. Pacific ports	1.85c. to 1.90c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.70c.
F.o.b. Lackawanna	1.70c.
F.o.b. Bethlehem	1.70c.
Del'd Cleveland	1.78½c.
Del'd Philadelphia	1.71c. to 1.76c.
Del'd New York	1.85¼c.
C.i.f. Pacific ports	2.05c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, Pittsburgh	1.65c.
Wider than 6 in., P'gh	1.55c.
6 in. and narrower, Chicago	1.75c.
Wider than 6 in., Chicago	1.65c.
Cooperage stock, P'gh	1.75c. to 1.85c.
Cooperage stock, Chicago	1.85c. to 1.95c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.10c.
Bars, f.o.b. Chicago	2.10c.
Bars, Cleveland	2.10c.
Bars, Buffalo	2.10c.
Shafting, ground, f.o.b. mill	*2.45c. to 3.40c.
Strips, P'gh	2.15c.
Strips, Cleveland	2.15c.
Strips, deliv'd Chicago	2.43c.
Strips, Worcester	2.30c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	3.20c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland)

To Manufacturing Trade

Bright wire	2.20c.
Spring wire	3.20c.

To Jobbing Trade

	Base per Keg
Standard wire nails	$1.90
Smooth coated nails	1.90
Galvanized nails	3.90

	Base per Lb.
Smooth annealed wire	2.35c.
Smooth galvanized wire	2.80c.
Polished staples	2.35c.
Galvanized staples	2.60c.
Barbed wire, galvanized	2.55c.
Woven wire fence, Nos. 9 and 11 gage, per net ton	$55.00
Woven wire fence, No. 12½ gage and lighter, per net ton	60.00

To Retail Trade

	Base per Keg
Standard wire nails	$2.00
Cement coated nails	2.00
Galvanized nails	4.00

	Base per Lb.
Smooth annealed wire	2.45c.
Smooth galvanized wire	2.90c.

	Base per Lb.
Polished staples	2.45c.
Galvanized staples	2.70c.
Barbed wire, galvanized	2.65c.
Woven wire fence, Nos. 9 and 11 gage, per net ton	$60.00
Woven wire fence, 12½ gage and lighter, per net ton	65.00

Anderson, Ind., mill prices are ordinarily $1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill $2 a ton over Pittsburgh, and Birmingham mill $3 a ton over Pittsburgh.

Sheets

Hot-Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.70c.
No. 10, f.o.b. Chicago mills	1.80c.
No. 10, del'd Philadelphia	1.99c.
No. 10, f.o.b. Birmingham	1.85c.
No. 10, c.i.f. Pacific Coast ports	2.33c.

(Note: To above prices are added extras for annealing and for width over 48 in., and for less than five tons of each gage or size.)

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.40c.
No. 24, f.o.b. Chicago mills	2.50c.
No. 24, del'd Philadelphia	2.69c.
No. 24, f.o.b. Birmingham	2.55c.
No. 24, c.i.f. Pacific Coast ports	2.88c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.35c.
No. 10 gage, f.o.b. Chicago mills	2.45c.
No. 10 gage, del'd Philadelphia	2.64c.
No. 10 gage, f.o.b. Birmingham	2.50c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.95c.
No. 20 gage, f.o.b. Chicago mills	3.05c.
No. 20 gage, del'd Philadelphia	3.24c.
No. 20, f.o.b. Birmingham	3.10c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	3.10c.

Steel Furniture Sheets

No. 10, f.o.b. Pittsburgh	2.75c.
No. 20, f.o.b. Pittsburgh	3.35c.

(Prices on furniture stock include stretcher leveling but not resquaring).

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.90c.
No. 24, f.o.b. Chicago Mills	3.00c.
No. 24, del'd Philadelphia	3.19c.
No. 24, f.o.b. Birmingham	3.05c.
No. 24, c.i.f. Pacific Coast ports	3.38c.

Long Ternes

No. 24, unassorted, 8-lb. coating, f.o.b. P'gh	3.15c.

Vitreous Enameling Stock

No. 10, f.o.b. Pittsburgh	2.90c.
No. 20, f.o.b. Pittsburgh	3.40c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.50c. to 2.60c.
No. 26, Chicago mills	2.60c. to 2.70c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mills	$5.00
Standard cokes, f.o.b. Gary	5.10

Terne Plate

(*F.o.b. Morgantown or Pittsburgh*)
(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.30
15-lb. coating I.C.	12.90
20-lb. coating I.C.	14.00
25-lb. coating I.C.	$15.20
30-lb. coating I.C.	16.00
40-lb. coating I.C.	17.80

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quantity Bar Base 2.65c. per Lb.

S.A.E. Series Numbers		Alloy Differential
2000	(½% Nickel)	$0.25
2100	(1¼% Nickel)	0.55
2300	(3½% Nickel)	1.50
2500	(5% Nickel)	2.25
3100	Nickel Chromium	0.55
3200	Nickel Chromium	1.35
3300	Nickel Chromium	3.80
3400	Nickel Chromium	3.20
4100	Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100	Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600	Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel)	1.05
5100	Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100	Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100	Chromium Spring Steel	0.20
6100	Chromium Vanadium Bar	1.20
6100	Chromium Vanadium Spring Steel	0.95
9250	Silicon Manganese Spring Steel (flats)	0.25
	Rounds and squares	0.50
	Chromium Nickel Vanadium	1.50
	Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	34.00
Light (from rail steel), f.o.b. mill	32.00

Track Equipment

	Base per 100 Lb.
Spikes, ⅝ in. and larger	$2.70
Spikes, ½ in. and larger	2.70
Spikes, boat and barge	2.90
Tie plate, steel	1.95
Angle bars	2.75
Track bolts, to steam railroads	$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count	73 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛	47	21½	¼ and ⅜	+11	+36
¼ to ⅜	53	27½	½	23	5
½	58	44½	¾	28	11
¾	62	50½	1 and 1¼	31	15
1 to 3	64	52½	1½ and 2	35	18

Lap Weld

2	57	45½	2	23	8
2½ to 6	61	49½	2½ to 3½	28	13
7 and 8	58	45½	4 to 6	30	17
9 and 10	56	43½	7 and 8	29	16
11 and 12	55	42½	9 to 12	26	11

Butt Weld, extra strong, plain ends

⅛	43	26½	¼ and ⅜	+13	+41
¼ to ⅜	49	32½	½	23	7
½	55	44½	¾	28	12
¾	60	49½	1 to 2	34	18
1 to 1½	62	51½			
2 to 3	63	52½			

Lap Weld, extra strong, plain ends

2	55	44½	2	29	13
2½ to 4	59	48½	2½ to 4	34	20
4½ to 6	58	47½	4½ to 6	33	19
7 to 8	54	41½	7 and 8	31	17
9 and 10	47	34½	9 to 12	21	8
11 and 12	46	33½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discounts of 5 and 2½%, and on galvanized by 1½ points with supplementary discounts of 5 and 2½%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	38	1½ in.	1
2½ in.—2¾ in.	46	1¾ in.	8
3 in.	52	2 in.—2¼ in.	13
3¼ in.—3¾ in.	54	2½ in.—2¾ in.	16
4 in.	57	3 in.	17
4½ in. to 6 in.	46	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	61	3 in.	46
1¼ to 1½ in.	53	3¼ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2¼ in.	32	4½, 5 and 6 in.	40
2½ to 2¾ in.	40		

Hot Rolled

2 and 2¼ in.	38	3¼ to 3½ in.	54
2½ and 2¾ in.	46	4 in.	57
3 in.	52	4½, 5 and 6 in.	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 0.40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

▲▲▲ Non-Ferrous Metal Markets ▲▲▲

Copper Exports at 500 Tons a Day—Tin Market Active—Zinc Price Off

NEW YORK, Aug. 18.

COPPER

The domestic market for electrolytic copper continued inactive through the week, with primary producers maintaining 8c., delivered Connecticut Valley, which puts them out of the market, as custom smelters are selling at 7.50c., delivered. Although stocks of refined copper increased 26,943 tons in July to a total of 440,417 tons, according to the American Bureau of Metal Statistics, blister copper stocks decreased 8592 tons to a total of 178,761 tons. Production during the month was at the lowest rate in about eight years. The price of Copper Exporters, Inc., is being maintained at 8c. a lb., c.i.f. usual European ports, which is on a basis of 7.75c., delivered in the domestic market, despite general selling by custom smelters at 7.50c., delivered. Compared with late July, foreign buying has been fairly active in the first half of the month, with a total of about 8000 tons. In the past week, sales have aggregated about 500 tons a day. Lake copper has been quoted by a large producer at 7.87½c., delivered, for the past week, and other sellers are quoting on this basis, or are temporarily out of the market.

TIN

Buying by consumers here was active throughout the week, most purchases having been for nearby delivery. As a result, the market advanced in the week from 26c. a lb., New York, to 26.25c., after which it settled to a range of 25.70c. to 26c. today. This activity in the American market stimulated London prices, and the quotations there today were £114 7s. 6d. a ton for spot standard, £116 17s. 3d. for future standard and £115 16s. 3d. for spot Straits. The Singapore price was £119 12s. 6d. Stocks of tin in British warehouses at Liverpool and London have advanced 84 tons to 31,781 tons. Shipments from the Straits in the first half of August totaled 2174 tons, on the basis of which shipments for the month are estimated at 5000 tons, compared with 7641 tons in July.

LEAD

Prices continue steady at 4.22½c., St. Louis, and 4.40c., New York. Buying is light as most consumers are covered for their nearby requirements. Stocks of lead declined further in July, decreasing 5740 tons to a total of 133,958 tons. Small tonnages for September delivery have been booked by certain producers, but a substantial part of September requirements is still to be placed by consumers.

ZINC

The market was fairly steady in the absence of substantial buying until Monday, when sales of zinc were made at both 3.82½c. and 3.80c., East St. Louis. On Tuesday most of the business closed was at the lower price. With current buying small, sellers expect increased demand for September delivery, as almost no forward business has been placed so far this month.

ANTIMONY

The Chinese metal for prompt shipment is unchanged at 6.60c. a lb., duty paid, New York, and the domestic smelter at Laredo, Tex., is quoting an equivalent price, shipping from stocks in New York and Baltimore. For future delivery, importers are asking 6.50c., duty paid, New York, but, with flood conditions prevailing in the Hankow district in China, there is some question as to shipments in the near future.

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	Aug. 18	Aug. 17	Aug. 15	Aug. 14	Aug. 13	Aug. 12
Lake copper, New York	7.87½	7.87½	7.87½	7.87½	7.87½	7.87½
Electrolytic copper, N. Y.*	7.25	7.25	7.25	7.25	7.25	7.25
Straits tin, spot, N. Y.	25.70	25.87½	....	26.20	26.25	26.00
Zinc, East St. Louis	3.80	3.80	3.82½	3.82½	3.82½	3.82½
Zinc, New York	4.15	4.15	4.17½	4.17½	4.17½	4.17½
Lead, St. Louis	4.22½	4.22½	4.22½	4.22½	4.22½	4.22½
Lead, New York	4.40	4.40	4.40	4.40	4.40	4.40

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel, electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 6.60c. a lb., New York.

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New York, Chicago or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass	15.37½c.
*Copper, hot rolled, base sizes	17.62½c.
Seamless Tubes—	
Brass	20.25c.
Copper	20.12½c.
Brass Rods	13.62½c.
Brazed Brass Tubes	24.25c.

*Extra for cold-rolled, 3c. per lb.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks	9.25c. to 9.50c.
Zinc sheets, open	10.25c. to 10.50c.

Metals from New York Warehouse

Delivered Prices, per Lb.

Tin, Straits pig	28.00c. to 29.00c.
Tin, bar	30.00c. to 32.00c.
Copper, Lake	9.75c. to 10.75c.
Copper, electrolytic	9.25c. to 9.75c.
Copper, casting	9.00c. to 9.50c.
Zinc, slab	5.00c. to 5.50c.
Lead, American pig	5.25c. to 6.25c.
Lead, bar	7.00c. to 8.00c.
Antimony, Asiatic	9.50c. to 10.50c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure)	20.00c. to 22.00c.
Alum. ingots, No. 12 alloy	19.00c. to 21.00c.
Babbitt metal, commercial grade	20.00c. to 30.00c.
Solder, ½ and ½	17.50 to 18.50c.

Metals from Cleveland Warehouse

Delivered Prices, per Lb.

Tin, Straits pig	29.50c.
Tin, bar	31.50c.
Copper, Lake	8.87½c.
Copper, electrolytic	8.87½c.
Copper, casting	8.25c.
Zinc, slab	5.50c. to 5.75c.
Lead, American pig	5.25c.
Lead, bar	7.75c.
Antimony, Asiatic	10.00c.
Babbitt metal, medium grade	15.00c.
Babbitt metal, high grade	34.00c.
Solder, ½ and ½	19.00c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses. (All prices are nominal because of uncertain condition of market.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	6.00c.	6.75c.
Copper, hvy and wire	5.75c.	6.50c.
Copper, light and bottoms	4.75c.	5.50c.
Brass, heavy	3.25c.	4.00c.
Brass, light	2.50c.	3.50c.
Hvy. machine composition	4.75c.	5.50c.
No. 1 yel. brass turnings	3.50c.	4.25c.
No. 1 red brass or compos. turnings	4.25c.	5.00c.
Lead, heavy	3.25c.	3.75c.
Zinc	1.50c.	2.00c.
Sheet aluminum	9.25c.	11.25c.
Cast aluminum	3.50c.	5.50c.

FABRICATED STRUCTURAL STEEL

Projects of 24,000 Tons Include 8500 Tons for Express Highway—Awards Only 13,000 Tons

ABOUT 24,000 tons of fabricated structural steel projects this week compare with 26,000 tons a week ago and 32,500 tons two weeks ago. The total includes 8500 tons for an additional section of overhead express highway on route 25 in New Jersey, 3000 tons for bridges in Illinois, 2000 tons for a high school addition in Chicago, 2000 tons for an exhibit building at the Chicago World's Fair and 1150 tons for two post offices, one at Brownsville, Tex., requiring 650 tons and the other at South Bend, Ind., 500 tons.

Only about 13,000 tons of business was awarded in the week, which is the smallest total since the end of April, when awards were also 13,000 tons for the week. Included are 1200 tons for a vocational school in the Borough of Richmond, New York, 1210 tons for a bridge at Monroe, La., 1375 tons for a building in Cincinnati for the *Times-Star* and 1100 tons for a hotel at Hershey, Pa. Awards follow:

North Atlantic States

CAMBRIDGE, MASS., 250 tons, Harvard University memorial chapel, to Palmer Steel Co.

BEVERLY, MASS., 105 tons, gas holder, to Chicago Bridge & Iron Co.

NEW YORK, 1200 tons, vocational school in Borough of Richmond, to Easton Structural Steel Co.

NEW YORK, 500 tons, alterations to Post Office at Pennsylvania Railroad terminal, to Shoemaker Bridge Co.

NEW YORK, 830 tons, apartment at 101 Lafayette Avenue, Brooklyn, to Harris Structural Steel Co.

STATE OF NEW YORK, 125 tons, highway bridge, to American Bridge Co.

AFTON, N. Y., 230 tons, grade crossing elimination for Delaware & Hudson Railroad, to McClintic-Marshall Corpn.

FREEPORT, N. Y., 400 tons, grade school building, to J. Klein Iron Works.

NEWARK, N. J., 200 tons, telephone exchange building, to Hudson Structural Iron Works.

HIGH RIDGE, N. J., 110 tons, bridge for Central Railroad of New Jersey, to Phoenix Bridge Works.

HERSHEY, PA., 1100 tons, Hotel Hershey, to Bauman Iron Works.

PENNSYLVANIA RAILROAD, 125 tons, bridge, to American Bridge Co.

KITTANNING, PA., 100 tons, bridge, to Fort Pitt Bridge Works.

CITY OF BALTIMORE, 400 tons, highway bridge, to Bartlett Hayward Co.

The South

MONROE, LA., 1210 tons, Ouachita River bridge, to Nashville Bridge Co.

ALEXANDRIA, LA., 1170 tons, Red River bridge, to Nashville Bridge Co.

Central States

CINCINNATI, 1375 tons, *Times-Star* Building, to Wheeling Structural Steel Co.

TOLEDO, OHIO, 280 tons, building for International Harvester Co., to Berger Iron Works.

CHICAGO, 140 tons, press support for Chicago *Daily News*, to Duffin Iron Co.

CHICAGO, 115 tons, alterations to First National Bank, to Wendnagel & Co.

RICHLAND, IOWA, 300 tons, highway bridge, to Pittsburgh-Des Moines Steel Co.

MILWAUKEE, 250 tons, Allis-Chalmers Mfg. Co., to Wisconsin Bridge Co.

MINNEAPOLIS & ST. LOUIS RAILROAD, 200 tons, fruit house, to Minneapolis Moline Power Implement Co.

SPRINGFIELD, ILL., 200 tons, Wabash bridge, to Mississippi Valley Structural Steel Co.

ST. PAUL, MINN., 400 tons, University of Minnesota dental building, to Crown Iron Works, Chicago.

BIG HORN, MONT., 400 tons, highway bridge, to Minneapolis Moline Power Implement Co.

Western States

SAN FRANCISCO, 200 tons, building for Y.W.C.A., to Judson-Pacific Co.

KEDDIE, CAL., 425 tons, State highway bridge in Plumas County, to Pacific Engineering Co., through Rocca & Calletti, contractors.

SAN FRANCISCO, 100 tons, shed on pier 39, to Judson-Pacific Co.

SAN FRANCISCO, 300 tons, office building at McAllister and Polk Streets, to Judson-Pacific Co.; Barrett & Hilp, contractors.

STRUCTURAL PROJECTS PENDING

Inquiries for fabricated steel work include the following:

North Atlantic States

BOSTON, 300 tons, roof garden on Motor Mart.

BOSTON, 175 tons, Five Cents Savings Bank addition.

QUINCY, MASS., 120 tons, two city bridges.

NEW YORK, 7000 tons, Bronx County Court House. Low bidders for general contract on alternate specifications, William Kennedy Co., Brooklyn; Kenny Brothers, New York; T. J. Waters Co., New York.

NEW YORK CENTRAL RAILROAD, 7500 tons, viaduct from Eighteenth to Thirtieth Streets; low bidder for general contract, James Stewart & Co., New York.

STATE OF NEW YORK, 1000 tons, highway bridges.

ITHACA, N. Y., 300 tons, bank building.

STATE OF NEW YORK, 1000 tons, Pilgrim Hospital on Long Island.

WINGDALE, N. Y., 600 tons, building for Harlem Valley Hospital.

DELAWARE COUNTY, N. Y., 300 tons, highway bridge.

ONEONTA, N. Y., 175 tons, normal school.

STATE OF NEW JERSEY, 8500 tons, section of overhead express highway on route 25; bids open Aug. 31.

STATE OF NEW JERSEY, 215 tons, two bridges in Bergen County, route 2, section 6; bids open Aug. 24.

BYBERRY, PA., 250 tons, addition to Children's Department, Philadelphia Institution for the Feeble Minded.

POTTSVILLE, PA., 200 tons, high school at Sixteenth and Elk Streets.

The South

LOUISVILLE & NASHVILLE RAILROAD, 250 tons, train shed at Birmingham.

BROWNSVILLE, TEX., 650 tons, Post Office building.

Central States

GALION, OHIO, 130 tons, factory extension for Gledhill Road Machinery Co.

ATHENS, OHIO, 250 tons, highway bridge.

ELYRIA, OHIO, 100 tons, highway bridge; bids taken Aug. 21.

PEORIA, ILL., 2000 tons, highway bridge.

STATE OF ILLINOIS, 1000 tons, miscellaneous bridge work.

SOUTH BEND, IND., 500 tons, Post Office.

CHICAGO, 2000 tons, proposed high school addition.

CHICAGO, 2000 tons, general exhibit building for World's Fair; bids to be taken soon.

TWO RIVERS, WIS., 550 tons, Twenty-second Street bridge; bids close Aug. 27.

MILWAUKEE, 225 tons, bridges for new Milwaukee-Chicago highway; bids close Aug. 25.

Western States

CENTRAL POINT, ORE., 500 tons, penstock.

NACHES, WASH., 600 tons, bridge.

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Railroad Equipment

New York Central may build from 200 to 500 gondola cars in its own shops.

Pennsylvania Railroad will build 20 locomotive tenders in its Altoona, Pa., shops.

Standard Oil Co. of Indiana has ordered 108 tank cars from Union Tank Line, its subsidiary.

An order has been received by the Timken Roller Bearing Co., Canton, Ohio, for the bearings for 150 of the new electric locomotives to be built for the Pennsylvania Railroad for its electrification project between New York and Washington. It is by far the largest order for anti-friction bearings ever placed by any railroad at any one time. The order includes tapered roller bearings for all of the engine trucks and the drive wheels.

Reinforcing Steel

Awards in Larger Volume—Pending Projects Also Gain

BOOKINGS of reinforcing steel the past week aggregated 3570 tons, compared with 1330 tons in the previous week. A war memorial in San Francisco, requiring 750 tons, is the largest letting. About 8830 tons is added to pending projects, compared with 7800 tons a week ago. The largest new job, 2000 tons, is for State road work in northern Illinois. Awards follow:

BOSTON, 100 tons, Professional Arts building, to Concrete Steel Co.

NEW YORK, 100 tons, sewer on West Fifty-ninth Street, awarded by Clevorock, Inc., New York, contractor, to Joseph T. Ryerson & Son, Inc.

NEW YORK, 100 tons, contracts 3 and 5 for sewer construction in Borough of Queens, to National Bridge Co.

CLEVELAND, 150 tons, Juvenile Court building, awarded to Joseph T. Ryerson & Son, Inc.; steel to be supplied by Republic Steel Corpn.

CHICAGO, 100 tons, Jefferson Electric Co., to an unnamed bidder.

CHICAGO, 100 tons, Y.W.C.A., to various bidders.

RACINE, WIS., 600 tons, St. Mary's Hospital, to American System of Reinforcing.

CHICAGO, 350 tons, Commonwealth Edison Co., to American System of Reinforcing.

LOUISVILLE, KY., 330 tons, superstructure for Post Office building, to Laclede Steel Co.

TULARE COUNTY, CAL., 140 tons, five highway bridges, to Pacific Coast Steel Co.

HUMBOLDT AND PLUMAS COUNTIES, CAL., 150 tons, highway bridges, to Soule Steel Co.

SAN FRANCISCO, 750 tons, War Memorial building, to Pacific Coast Steel Co.

SALT LAKE CITY, 250 tons, Post Office additions, to Concrete Engineering Co., Los Angeles.

SALT LAKE CITY, 250 tons, Veterans' Hospital, to Concrete Engineering Co., Los Angeles.

FRESNO, CAL., 100 tons, County hospital additions, to Kyle & Co.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

BUFFALO, N. Y., 125 tons, addition to Washburn-Crosby Co. mill.

WINGDALE, N. Y., 1000 tons, building for Harlem Valley Hospital; bids open Aug. 20.

STATE OF NEW JERSEY, 300 tons, foundations on overhead express highway, route 25; bids open Aug. 31.

STATE OF NEW JERSEY, 100 tons, highway construction in Bergen County, including bridges on route 2, section 6; bids open Aug. 24.

EASTON, PA., 100 tons, building for Individual Drinking Cup Co.

WASHINGTON, 2500 tons, Federal Warehouse at C and D, Eighteenth and Nineteenth Streets; previously reported as 1000 tons.

OHIO HIGHWAY COMMISSION, 125 tons, culverts in Hamilton County; bids taken Aug. 21.

CHICAGO, 100 tons, Henschien's sausage factory.

GLENELLYN, ILL., 125 tons, sewage disposal plant.

SPRINGFIELD, ILL., 2000 tons, State road work in northern counties.

CHICAGO, 290 tons, pachyderm house at Chicago zoo.

MEMPHIS, TENN., 1500 tons, municipal pumping station.

LITTLE ROCK, ARK., 350 tons, Post Office building.

GLENDALE, CAL., 100 tons, Canada Boulevard bridge.

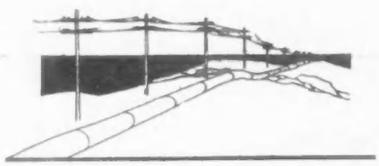
LOS ANGELES, 500 tons, overland terminal warehouse.

LOS ANGELES, 150 tons, swimming stadium in Exposition Park.

WENATCHEE, WASH., 135 tons, City reservoir.

GUADALUPE, CAL., 100 tons, memorial building.

SAN FRANCISCO, 230 tons, Silver Avenue Catholic school.



PIPE LINES

Stanoland Pipe Line Co., Tulsa, Okla., subsidiary of the Standard Oil Co. of Indiana, is inquiring for 350 miles of line pipe, including 195 miles of 12¾-in., 90 miles of 10¾-in. and 65 miles of 8⅝-in. About 36,600 tons of steel will be required, and the inquiry does not specify the shipping point.

Lycoming Natural Gas Co. is said to be rushing plans for an extension to its recently ordered pipe line to run from Syracuse to Albany, N. Y., which will take 95 miles of 10¾-in. pipe, calling for 15,000 tons of steel.

Skelly Oil Co. is taking bids on 15 miles of 6-in. pipe and 30 miles of 10-in. material, amounting to about 5000 tons. Destination is unspecified.

Lycoming Natural Gas Corpn., Wayne, N. Y., a subsidiary of Standard Oil Co. of New Jersey, 26 Broadway, New York, is purchasing a right-of-way for a pipe line for natural gas service from Wayne to Penn Yan, N. Y., about 18 miles. Company has contracted for gas supply from Bigelow wells in Wayne field, operated by Bigelow Natural Gas Corpn.

Metropolitan Water Board, Los Angeles, has called a special election on Sept. 29 to approve a bond issue of $220,000,000 for construction of proposed Colorado River aqueduct for water supply. Steel pipe will be used in conjunction with open canals, closed surface conduit with steel pipe being estimated to cost about $36,317,700 of gross sum noted. F. E. Weymouth is chief engineer.

Missouri Valley Pipe Line Co., Omaha, Neb., plans construction of a 16-in. pipe line for natural gas service at Sioux Falls, S. D., distribution to be handled by Sioux Falls Gas Co., affiliated organization, which is securing franchise.

Western Service Corpn., Braniff Building, Oklahoma City, Okla., has awarded a contract to R. O. Moore Construction Co., Tulsa National Bank Building, Tulsa, Okla., for construction of pipe line from Guthrie, Okla., to oil fields near Oklahoma City, for natural gas service.

Detroit Water Department will take bids next week on 285 tons of pipe.

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Recovery of Secondary Metals in 1930

The value of certain nonferrous metals recovered from secondary sources in 1930 is reported to the United States Bureau of Mines as $193,255,100, which is $137,773,800 less than in 1929, and the total quantity decreased 24 per cent. This decrease in value was partly due to the lower yearly average prices of copper, lead, zinc, tin and antimony in 1930. There were, moreover, large decreases in the quantity of each of the secondary metals recovered.

Shipments of scrap copper and brass to Europe declined and the imports were less in 1930 than in 1929. The smelters that treat mainly primary material produced 26,809 tons less secondary copper in 1930 than in 1929.

There was a decrease of 26 per cent in secondary lead reported by regular smelters that treat mainly ore and bullion, and there was also a large decrease in the output of lead in alloys reported by smelters that treat scrap and drosses.

The zinc recovered by redistillation decreased about 12,500 tons, and that recovered by remelting and sweating decreased about 3600 tons. There were also decreases in the quantities of zinc dust, zinc chloride and zinc sulphate made from zinc residues and zinc dross.

Detinning plants treated about 13,400 gross tons less clean tin plate clippings in 1930 than in 1929, and the yield per ton increased considerably. About 69 per cent of the recoveries at detinning plants was as tin content in tin tetrachloride, tin oxide and other chemical compounds, compared with 76 per cent in 1929. The only old tin-coated containers treated were those used to make window weights and for the precipitation of copper from mine waters. No tin was recovered in these processes.

British Industry Hopes for New Budget Without Increase in Tax Burden

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(By Cable)

LONDON, ENGLAND, Aug. 17.

ATTENTION of British industry is centered on the budget revision, and it is feared that balancing the Nation's accounts may be effected as in the past by increasing taxation rather than by preventing wasteful extravagance. However, there is hope of reform in expenditures as a result of the rapprochement of all political parties.

There is a strong conviction in business circles that additional taxation will provide no remedy, but it is believed highly improbable that the Government will accept the recommendations made by the Committee on National Expenditures.

It is suggested in certain quarters that a 10 per cent duty on all imports is being considered, but this cannot be confirmed. Prime Minister MacDonald has denied a report that party leaders have demanded voluntary reductions in wages and salaries.

On the Continent it is reported that two large steel interests in the Ruhr are negotiating a merger, and the Gutehoffnungshutte A. G. and Hoesch Steel Works are mentioned in this connection.

Contracts recently placed by the Soviet Union in Germany may be diverted to other steel producing countries because of German difficulty in granting the required credits at present. Polish mills have secured small orders from the Soviet Union for railroad material.

Plans for the first unit of the new

First unit of Mariupol Steel Works in U. S. S. R. to be completed in 1932 with annual capacity of 1,300,000 tons of steel ingots.

* * *

China has "Ten-Year Plan" to build billion-dollar steel industry and non-ferrous metal plants.

* * *

New type of rustless steel casting developed by Krupp works in Germany.

* * *

Japanese cast iron pipe maker considers exporting to United States.

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Mariupol Steel Works in the U. S. S. R. call for four blast furnaces with an annual capacity of 920,000 metric tons of pig iron, 11 open-hearth furnaces to produce 1,300,000 tons of steel ingots annually and rolling mills chiefly for 25-meter rails.

By the second half of 1932 it is expected that two blast furnaces and four open-hearth furnaces will be ready for operation at the new works. When completed by the building of second and third units, the new Mariupol works is to have a capacity close to 3,000,000 tons of steel annually.

The Chinese Ministry of Industry has proposed an elaborate and ambitious "Ten-Year Plan," which includes the construction in China of blast furnaces and steel works to cost about £190,000,000 ($923,400,000) and the establishment of a non-ferrous metal industry for production of copper, tin, lead, zinc and aluminum requiring plants to cost £45,000,000 ($218,700,000). The plan also calls for heavy purchases of locomotives and rolling stock.

French banking interests are negotiating with the Government of Latvia to supply French railroad material on credits. At a recent meeting, the chairman of the board of the Ougree-Marihaye works informed stockholders that the present crisis is partly the result of four years' stoppage of production during the war in certain industrial countries, followed by a heavy post-war demand, which inevitably receded. The present crisis, he pointed out, is merely a readjustment from abnormal to normal conditions.

United Kingdom exports of pig iron in July totaled 19,000 tons, of which 650 tons went to the United States. Total iron and steel exports for the month were 168,000 tons.

French mills have been active sellers recently, especially in shapes, but German works are not interested in selling finished steel products at the present level of prices. German mills, however, are seeking some semi-finished steel business.

British tin plate is quiet, but prices are firm. Sellers of galvanized sheets are seeking orders, and are prepared to offer further concessions in price to obtain business.

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp with the £ at $4.8665 (par)

British Prices, f.o.b. United Kingdom Ports

Ferromanganese, export	£9	0s.					$43.74		
Billets, open-hearth	4	17½	to	£5	5s.		23.69	to	$25.52
Black sheets, Japanese specifications	10	0					48.66		
Tin plate, per base box	0	13⅜	to	0	13½		3.25	to	3.28
							Cents a Lb.		
Steel bars, open-hearth	7	17½	to	8	7½		1.71	to	1.81
Beams, open-hearth	7	7½	to	7	17½		1.60	to	1.71
Channels, open-hearth	7	12½	to	8	2½		1.66	to	1.76
Angles, open-hearth	7	7½	to	7	17½		1.60	to	1.71
Black sheets, No. 24 gage	8	5	to	8	10		1.79	to	1.84
Galvanized sheets, No. 24 gage	9	0	to	9	2½		1.95	to	1.98

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	£2	8s.	to	£2	9s.		$11.66	to	$11.91
Billets, Thomas	£3	1s.	to	£3	2s.		$14.82	to	$15.07
Wire rods, low C., No. 5 B.W.G.	4	15	to	5	0		23.09	to	24.30
Rails, light	6	0					29.20		
Black sheets, No. 31 gage, Japanese	11	5	to	12	12		54.68	to	58.32
							Cents a Lb.		
Steel bars, merchant	3	7	to	3	8		0.73	to	0.74
Beams, Thomas, British standard (nominal)	3	6	to	3	7		0.72	to	0.73
Channels, Thomas, American sections	5	12	to	5	14		1.24	to	1.26
Angles, Thomas, 4-in. and larger, over ⅜-in. thick	3	6	to	3	6½		0.72	to	0.73
Angles, Thomas, 3-in.	3	8	to	3	9		0.74	to	0.75
Hoops and strip steel over 6-in. base	4	5					0.94		
Wire, plain, No. 8 gage	5	0	to	5	1¼		1.09	to	1.10
Wire, barbed, 4-pt. No. 12 B.W.G.	8	10					1.87		

Liquid Lead Coating May Be Made Here

LONDON, ENGLAND, Aug. 8.—The Nor-Rust Liquid Lead Co., Ltd., which has developed a corrosion-resistant metal coating, is preparing to organize a subsidiary company in Canada, and may manufacture its product in the United States because of the tariff. The general manager of the company, W. Gordon Simpson, has sailed for Montreal and will arrive in the United States about the end of August.

In an interview with a representative of THE IRON AGE in London, Mr. Simpson said: "We are forming a company in Canada, but do not intend to manufacture there for the present. We will ship our product from the English works. In the United States, however, it will, of course, be necessary to plan a manufacturing plant, as the high tariff will prevent any appreciable increase of export trade to that market. Meanwhile, we are shipping small quantities of 'Nust' to individual American consumers. Certain large oil companies have been supplied with trial shipments and further orders are expected."

The newly developed coating, which is a liquefied lead, is stated by the maker to have a positive amalgamation with iron or steel. Application of a single coating is claimed to be sufficient to make metal permanently rustproof. Tests have been conducted which are said to show that the coating is not affected by temperature, sea water or gases. Steel sheets coated with "Nust" have been tested by partial immersion in ordinary London water, exposure to the atmosphere in London, and exposure to corrosive atmosphere in which both nitric and hydrochloric acid were present. Because of its extreme weight, about 45 lb. to the gallon, it is not suitable for use in a paint gun for spraying on metal. Tests of the coating were made by Riley, Harbord & Law, consulting metallurgists to the Bank of England and Royal Mint.

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Food for Unemployed Instead of Cash

HAMBURG, GERMANY, Aug. 5.—The Unemployment Insurance Bureau of the Government estimates that the total of unemployed during the coming winter will be at least 6,000,000 and possibly more. The Federation of German Industrials has presented an urgent petition to the Government to revise its unemployment insurance policy, suggesting that failure to relieve this growing burden may lead to financial difficulty for many industries. It is estimated that in July, which was not the worst month of the year, about 23 per cent of the total population of Germany was depending upon Federal or municipal unemployment payments ranging from 10 to 15 m. ($2.30 to $3.50) a week, per capita. The federation suggests that unemployment should be relieved partly through cash payments and partly through distribution of bread, flour and other foodstuffs, of which there is a surplus supply in stocks.

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German Furnaces Try to Curtail Use of Scrap

HAMBURG, GERMANY, Aug. 5.—Efforts are being made by the German Pig Iron Cartel to combat the increasing use of scrap in foundries, caused by the low prices now prevailing for old material. The cartel is also endeavoring to curtail the increased use of British, Indian and French pig iron. For some time foundries selling their finished output for export have received a bonus of 6 m. ($1.42) a ton from the pig iron sellers. The bonus has now been advanced to 10 m. ($2.38) a ton, but at least 85 per cent of all pig iron requirements must be bought through the cartel.

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World Aluminum Stocks About 185,000 Tons

HAMBURG, GERMANY, Aug. 5.—Total stocks of aluminum in all producing countries were about 150,000 tons at the end of last year and had increased to 185,000 tons by the end of June, according to the European Aluminum Association, which expires at the end of September, but which is expected to be renewed. Production in all countries in 1930 is placed at 273,490 tons by the association statistics.

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British Production of Iron and Steel Drops

LONDON, ENGLAND, Aug. 12 (*by cable*).—Output of pig iron in Great Britain in July was 317,000 gross tons, with steel ingots and castings at 428,700 tons. Both showed a decrease from June, in which month production was 323,800 tons of pig iron and 428,900 tons of steel ingots and castings.

Production for the first seven months of 1931, with comparisons of monthly averages of recent years, and of 1913, are shown below:

Date	Pig Iron	Steel
1913	855,000	638,600
1928	550,800	710,000
1929	632,400	804,600
1930	516,400	608,200
1931—January	337,200	402,200
February	318,200	486,400
March	357,100	500,100
April	323,200	397,400
May	346,500	435,100
June	323,800	428,900
July	317,000	428,700

Rustless Steel Casting Developed by Krupp

ESSEN, GERMANY, Aug. 3.—It is stated here that the Friedrich Krupp A. G. has developed a new analysis of rustless steel for castings. The new alloy is said to be less costly than the V2A, a factor expected to extend the market for cast "Nirosta." It is suitable for very thin castings, weighing only a few ounces, as well as the larger types, is resistant to corrosion. It may be welded, takes a high polish and is heat resistant to 1100 deg. C. The new alloy is furnished in two qualities, "Nirosta" Nos. 1 and 2, the second quality for all ordinary purposes, and the first for use where special resistance to acids is required. Because of extreme hardness, the castings are worked with tungsten carbide cutting metal or other hard alloy.

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Japan Develops Export of Cast Iron Pipe

YOKOHAMA, JAPAN, July 18.—Sale of 10,000 tons of cast iron water pipe to Java at the end of last year by the Kubota Iron Works in Japan has created interest abroad in Japanese cast iron pipe. The maker is now quoting on an inquiry from the Straits Settlements for 5000 tons of pipe and is considering the possibility of exporting some tonnage to the Pacific Coast of the United States.

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American Company Not To Buy Chilean Mines

HAMBURG, GERMANY, Aug. 5.—According to William H. Muller & Co., Rotterdam, Holland, large iron ore dealers, the projected sale of the Chilean iron ore mines at Algarrobo to an American steel company has been postponed as the American company has no need at present for additional ore. The Chilean company lost about $2,000,000 last year, compared with a profit in 1929 of $2,500,000, and shipped only about 600,000 tons of iron ore in the first half of this year, compared with 1,100,000 tons in the first half of 1930 and 1,600,000 tons in the same period of 1929.

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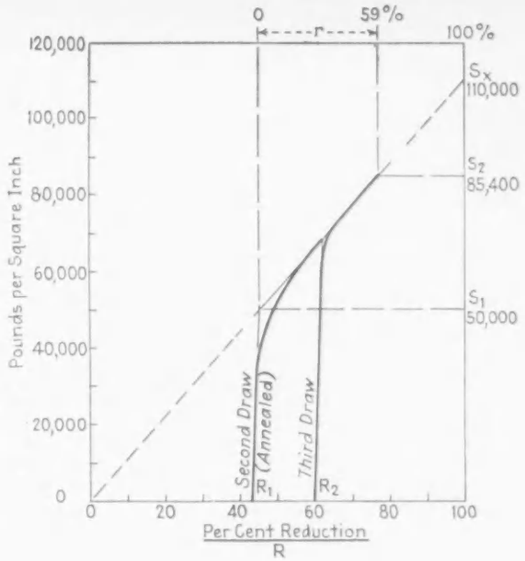
Ruhr Steel Wages Lower

DÜSSELDORF, GERMANY, Aug. 3.—Wages in the Ruhr steel industry have been reduced 5 to 6 per cent, following an agreement with the various workmen's unions.



Rate and Limits of Strain-Hardening of Plastic Metals

(*Continued from page 499*)

strained or offset in one direction from the equilibrium condition. Loading in the opposite direction should then cause a reverse movement along the same slip planes. As soon as the yield point is passed, the atoms would move back toward equilibrium and then beyond it, with an actual reduction in resistance before the rise begins again, as is shown in the figure. It is also common to find an initial yield point occurring below the rate of strain-hardening curve, as in the case of the annealed material in Fig. 3.

A PERFECT YIELD POINT, theoretically, would be a sharp point of junction between the elastic and plastic curves. This is demonstrated (above 15 per cent reduction) in Fig. 3. There, in each successive test, the stress rises elastically to the rate of strain-hardening curve, at which point a sharp change occurs. That is, the metal yields and begins to move plastically. Elastic limit and yield point are here, clearly, the same thing. This also suggests that the plastic, or strain-hardening, curve might also be designated as the yield-point curve.

The straight-line form of the plastic curve, between the upper and lower limits which have been described, seems reasonably demonstrated. An excellent illustration of it is given in Fig. 10, which is reproduced from Mr. Templin's paper on the "Effects of Cold-Working, etc." He has there shown the changes which take place in various physical properties of aluminum as the metal is cold-worked. The curves shown are compiled from a large volume of test material.

THE USE of such strain-hardening curves as are shown tentatively in Fig. 8 may be illustrated by Fig. 11 and the sample shells shown in Fig. 12. The first shell was blanked, drawn and annealed. It was then reduced in two drawing operations, without an intermediate anneal, by an amount which totals 59 per cent reduction in diameter. It is a commercial operation performed on a low-carbon deep-drawing steel, cleaned

FIG. 12.—(above) A steel shell (under 0.10 per cent carbon) is blanked and drawn, then annealed, then redrawn in two steps which total a reduction of 59 per cent, which is equivalent in working to 144 per cent elongation. (See Fig. 11).

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Fig. 11.—Strain-hardening during successive redraws of steel in walls of shells shown in Fig. 12, to illustrate formulas 1, 2 and 3.

before annealing, annealed in a continuous furnace and pickled thereafter.

For purposes of comparison and example the steel may be taken as S.A.E. No. 1010, carbon content 0.05 to 0.15 per cent, elongation in 2 in. of 30 to 40 per cent, reduction in area 55 to 65 per cent and commercial yield point 28,000 to 36,000 lb. to the square inch, according to standard specifications.

The strain-hardening of this steel at room temperature is assumed, from rather meager present data, to lie along the line 0—110,000, Fig. 11, and between the approximate limits of 50,000 lb. to the square inch as commercially annealed and 90,000 lb. ultimate. The lower limit refers of course to the theoretical yield point at the junction of the elastic and plastic curves or lines. The common test yield point would be likely to be lower than this, as given. The upper limit corresponds relatively to the 65 per cent reduction of the specifications.

For computing operations:

$$r = \frac{S_2 - S_1}{S_x - S_1} \quad \text{or} \tag{1}$$

$$S_2 = S_1 + r\,(S_x - S_1) \tag{2}$$

in which: r = per cent reduction in the particular operation, expressed as a decimal; see also Fig. 7,

S_1 = theoretical initial yield point, lb. to the square inch,

S_2 = final yield point or unit stress, not taking into account possible pyramiding of pressure in closed dies or because of relatively thin material,

S_x = theoretical extreme stress, which also designates rate of strain-hardening, since:

$$\frac{S_x}{1.00} = \frac{S_1}{R_1} = \frac{S_2}{R_2} \tag{3}$$

in which, R = corresponding absolute per cent reduction expressed as a decimal.

The example illustrated by Figs. 11 and 12 may then be solved to discover the extreme unit stress in the flange of the shell during the last reduction. The total reduction, r, accomplished without annealing, has been given as 59 per cent. The initial theoretical yield point S_1, for the commercially annealed metal should be the lower limit of the strain-hardening curve. Therefore:

$$S = S_1 + r\,(S_x - S_1)$$
$$= 50{,}000 + 0.59\,(110{,}000 - 50{,}000)$$
$$= 84{,}400 \text{ lb. to the square inch.}$$

This final stress is getting close to the upper limit of plasticity, at which all slip planes have been used up and fractures start. In fact, micro-examination of a last-operation shell did show small fractures in the cross section of the wall. The 59 per cent reduction in diameter (by compressive action) may be compared directly with the 55 to 65 per cent reduction in area at which a tensile fracture may be expected, according to standard specifications for this material.

The specified general elongation in 2 in. of 30 to 40 per cent is equivalent, according to Fig. 7, to a reduction in area of only 23.1 to 28.6 per cent. Such a reduction would bring the unit stress up to only 64,000 to 67,000 lb. to the square inch in Fig. 11, so that obviously most of the plastic working is being done in the necking range of the ordinary tensile test. The 59 per cent reduction, attained in the last draws of shells shown in Fig. 12, corresponds to an elongation of 144 per cent, a figure which is well up toward the ultimate elongation suggested in Fig. 13 for 0.10 per cent carbon steel.

Table I (page 253, THE IRON AGE, July 23) summarizes the plastic physical properties of Tobin bronze as indicated in the experiments which have been here described. It gives also four sets of test values obtained both in tension and in compression for four points along the plastic curve for this metal, in Fig. 8. These values check reasonably closely, too, with theoretical yield points obtained by formula (3) using $S_x/1.00 = 255{,}000$.

According to the brass scale of tempers, a quarter-hard metal undergoes about 11 per cent reduction by cold-working from the soft or annealed state. By formula (2) and the test data available, a quarter-hard Tobin bronze should have a theoretical yield point of about 50,000 lb. to the square inch. This would seem to indicate that the material listed in the second column of Table I was received in the quarter-hard state. The position of the several tempers can be indicated upon the plastic curve of any metal in much the same manner as they are indicated on the nominal tensile curve in Fig. 14.

The value of locating the position of the tempers upon the plastic curve should be considerable in laying out further operations. Thus it will be possible to select the hardest temper which will prove satisfactory for an operation requiring a given amount of cold-working. Or the amount of work that can be performed upon metal of a given temper, before annealing is required, may be approximated.

What the Plastic Cycle Is

IT was mentioned that metal may be required to traverse the plastic cycle a number of times in the course of its fabrication. Cold-working strain-hardens it to the limit of its plasticity. Further working would then create fractures, internal or external, which only complete remelting could remove. Annealing

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Fig. 13.—Physical properties of the ferrite-pearlite range of steels (right) arranged from the tensile test to show the pressure range in cold working, and the greater workability (ultimate per cent change) of the lower carbon steels. (Test data from Jeffries and Archer.)

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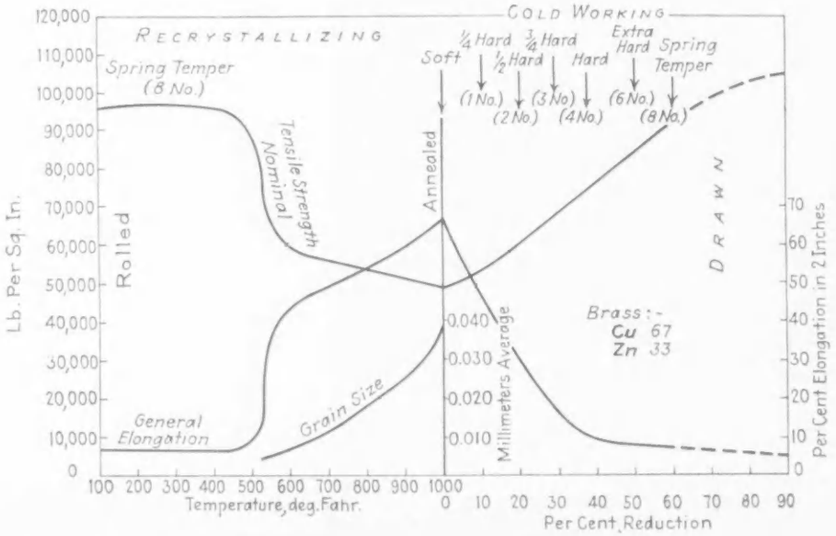
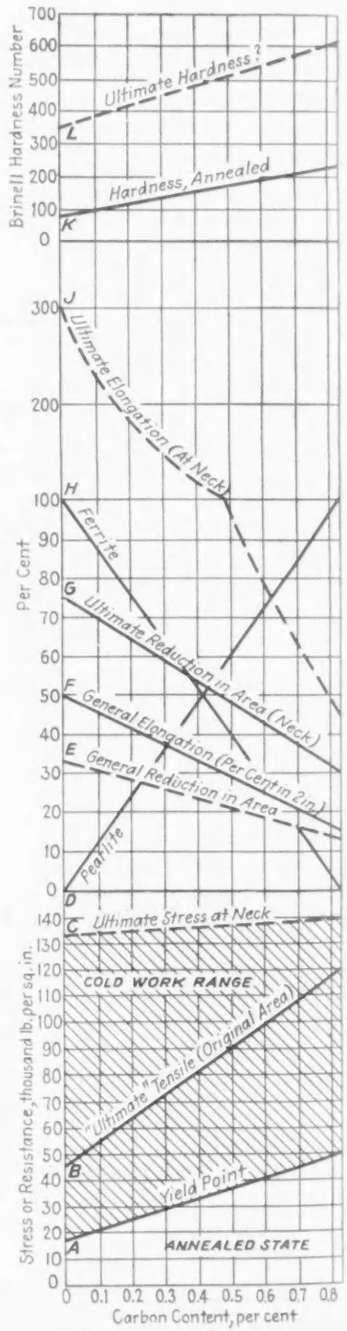
Fig. 14.—The Plastic Cycle. Changes in properties from spring temper through recrystallization to soft temper and then through cold-working to spring temper again. (After R. S. Pratt, Bridgeport Brass Co.)





must therefore be resorted to, to recrystallize the structure of the metal and restore its lost plasticity in preparation for the next operation. Under most circumstances and with proper care this cycle of strain-hardening and recrystallizing may be repeated any number of times.

An excellent illustration of the plastic cycle is shown in Fig. 14, arranged from research data furnished through the courtesy of R. S. Pratt and the Bridgeport Brass Co. Here a 67:33 brass, which had been strain-hardened by cold-rolling to "spring" temper (approximately 60 per cent reduction), was annealed to restore its plasticity and then cold-worked by drawing to the same reduction and the same temper. Several tempers of the brass scale are indicated in their normal relation to the per cent reduction, to show what the physical properties are in each case.

It has been mentioned that the nominal "ultimate tensile strength" is neither a true ultimate nor a unit stress. The actual *ultimate* unit strength would be practically unchanged throughout the cold-work range, and would be much higher than the maximum nominal value. The latter is really an inverse measure of the remaining plasticity of the metal in any particular state. That is, the more the metal has been worked the less it will change in area before all slip planes are used up and fracture occurs. That means a larger final area and therefore a larger total load. As this increasing load is divided by the original area (a constant), the result is an apparently increasing strength.

Cold-working, however, does increase the elastic limit, which is of interest for static designs, and also the slightly higher yield point, which is the vital figure in plastic working.

Elastic limit and yield point would be rather difficult to measure progressively in such a test. While they change more rapidly than the nominal tensile strength, the latter does give an idea of the way in which they change. (Note that Fig. 6 shows a comparison of nominal and actual plastic values in the tensile test. The lower curves show actual unit stresses based upon the changing area as the metal stretches and is strain-hardened.)

Thus, in Fig. 14, exposure at the lower temperatures does not affect either the nominal tensile strength or the yield point appreciably. After an anneal at the critical temperature both drop suddenly. Annealing at temperatures beyond it causes a further gradual drop in both. Wherever this process is stopped, the yield point will have become lower than the nominal ultimate. As the material is cold-worked the theoretical yield point (which may differ somewhat from the actual yield point in the lower values) will rise along a practically straight line until it joins the nominal and actual ultimate at the plastic limit, if the cold-working is carried that far. In fact, however, the end of the drawing test (solid lines) is indicated at the same per cent reduction as was applied in rolling. It will be noted that the tensile strength and elongation are then the same in value as they were after rolling, at the start of recrystallization.

(*To be continued*)

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Preventive Maintenance as Way to Reduce Costs

(*Concluded from page 485*)

But they are invaluable if they lead to the prompt elimination of incipient breakdown, or if they prevent the production of a lot of inferior material, due to worn equipment not working up to maximum accuracy.

"Maintenance that simply prevents breakdowns has not gone far enough. It should maintain equipment at its maximum of efficiency and accuracy or prescribe its elimination; otherwise maximum quality of product at minimum cost cannot be obtained. The records of a properly organized maintenance department should show the efficiency of equipment as accurately as modern control and wage incentive systems show that of workmen.

"That progress in maintenance is being made and its importance recognized is evinced by the fact that progressive firms put it in the charge of men of high caliber. This often leads to the purchase of new material, for good men will not be satisfied with inferior equipment. The necessity of a distinguishing mark or number for each machine, an adequate supply of repair parts properly labeled so that they can be selected instantly for the proper machines, is almost too obvious to be worthy of mention.

"Granting equal equipment, personnel and vision of management at the start, the position of a plant in the race for success will depend largely upon the quality of its maintenance department. The job of this department is not easy and often not pleasant, but its importance is beyond question. Its duties require attention to a myriad of details, many of which may seem trivial. But every maintenance engineer could well hang above his desk the motto of a great artist, who said: *Trifles make Perfection, but Perfection is no Trifle.*"

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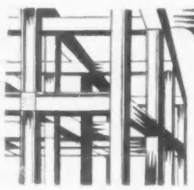
A PORTABLE device for measuring the moisture content of sand in the foundry has been described by A. Guedras (*Aciers Speciaux, Metaux et Alliages*, March, 1931). The method depends on the electrical conductivity of the water in the sand, so that comparable results can only be obtained with sand of the same salt content, such as the sand from a single locality. The instrument is tubular in shape, containing a dry cell, two electrodes at the bottom, and an ammeter at the top with a zero correction. A plane surface is prepared in a pile of sand by cutting sidewise with a shovel to avoid packing. The device is then set upright on the surface and is allowed to settle by its own weight. The meter reading increases with the moisture content.



PLANT EXPANSION AND EQUIPMENT BUYING

Summer Dullness Continues in Machine Tools

Plant Shutdowns and Vacation Absences Prolong Inactivity—July a Low Month

A MACHINE tool salesman made 14 calls in one day recently, and found in eight of them that the plant was shut down or the buyer was away on vacation. This is a common experience and reflects one of the reasons for the continued dullness in machine tool trade. It is virtually impossible to get action on old inquiries, and new requests for prices are at a minimum. The general attitude of prospective buyers is that nothing of importance in business will eventuate before some time in the fall; consequently vacation absences and plant shutdowns have been extended further than usual this summer.

Naturally, the machine tool trade looks for some improvement in September, when manufacturing executives will be back on the job and presumably a considerable number of plants, now idle, will resume part production at least. At best, however, the machine tool trade at present can visualize nothing more than a mild pick-up this fall.

There are few orders of size in immediate prospect. One item of importance is that the Board of Transportation, New York, will take bids Aug. 21 on the equipment for subway repair shops, including about 50 metal-working and wood-working machines. Orders for about 20 tools, including 17 lathes, for the Brooklyn Navy Yard, are eagerly awaited.

With the exception of November, 1930, July was the poorest month for the machine tool industry since 1921, but conditions in several months in that year of depression were very much worse than now. The National Machine Tool Builders' Association, in announcing that the average of machine tool sales in July is represented by the index figure 61.5, compared with 60.4 last November, derives some consolation from the fact that in several months of the summer of 1921 sales were down below 30 in its scale.

There is further encouragement in the fact that some of the machine tool companies reported that July was the best month of the current year except March, and it is regarded as possible that the results for these particular companies may foreshadow a seasonal upturn in August or September for other companies. For the "A" and "C" groups of the machine tool classification, which are the largest and the smallest companies, July was the poorest month in this business cycle, but the sales of the "B" group, comprising the medium-sized companies, were sufficient to bring the average above the low point of November.

The three months' moving average stands at 74.1, which is above that of last February, when it was 73.1. Unfilled orders are indexed at 202.3, or 2.8 times the volume of shipments in July. All figures of the machine tool association are based on 100 as representing average monthly shipments for 1922, 1923 and 1924.

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NEW YORK

Machine tool sales representatives report that the first half of August brought no improvement in sales or inquiries. Interest is centered in the bids to be received up to Aug. 21 by the Board of Transportation, New York, on about 50 machines for the 207th Street subway repair shops. Although machine tool representatives are not bidding directly on the list, many of them are submitting bids through millwright companies which will undertake to handle the complete installation. Orders from the Brooklyn Navy Yard for about 20 tools, including 17 lathes, are still being awaited.

CINCINNATI

Business volume continues to be small, but in sufficient quantity to warrant operations at about one-third of capacity throughout the summer. One or two plants have closed for short vacation periods. Inquiries have lessened as consumers indicate a desire to await developments in their own businesses before figuring on new equipment. An occasional checkback on old inquiries brings the stereotyped reply that consumers will buy when general business conditions show signs of clearing.

NEW ENGLAND

Dealers in new equipment report the market virtually at a standstill. No sales of consequence are noted, and there is a dearth of new inquiries. Old inquiries are dormant, and there is no indication when they will again become active. Used tool sales continue few and far between and mostly involve small tool room lathes and bench equipment.

Small tool sales are only fair. The closing of many metal-working plants for vacation periods is clearly making itself felt in the small tool market. Hack saw blades, formerly 40 and 10 per cent discount, are now 50 per cent off list.

PITTSBURGH

Local machinery dealers report little change in the character of business during the last week. Buying is very light and inquiry is spotty. Prospective purchasers show occasional interest in a few items, but are quite often inclined to delay buying until next month. Machinery salesmen are rather active and are developing some interest in plant modernization which may later result in orders.

The crane market is very dull and steel mill machinery and equipment is dormant. Reports of large improve-

HOW do you buy it?

Broadly speaking, there are two ways of buying wire rope:—(1) at the lowest price obtainable; (2) on a *performance* basis.

Number 1 ignores the fact that the initial cost of wire rope is merely one—and frequently an unimportant—element in wire rope economy.

Number 2 is predicated on the principle that true wire rope economy depends primarily on other factors; for example—the useful life of the rope, its inherent dependability and safety, its suitability for the equipment on which it is used.

It is to meet the requirements of this latter buying basis that Roebling Wire Rope is made.

JOHN A. ROEBLING'S SONS CO., TRENTON, N. J.

WIRE · WIRE ROPE · WELDING WIRE · FLAT WIRE · COPPER AND INSULATED WIRES AND CABLES · WIRE CLOTH AND WIRE NETTING

Branches in Principal Cities Export Dept.: New York, N.Y.

ROEBLING "BLUE CENTER" STEEL **WIRE ROPE**

ment programs on the part of steel companies persist, but are not resulting in actual inquiry.

CLEVELAND

The machine tool market is looking forward to September and speculating as to the volume of business for the coming month. Sales the past week were as light as during any previous month this summer, and no improvement in the situation is looked for during the remainder of August. One of the discouraging features is that there is virtually no new inquiry. The trade is hopeful of some improvement next month, although admitting that this will depend on the general business situation.

MILWAUKEE

The first half of August has witnessed somewhat greater interest in the acquisition of machine tools than either the first or last half of July, particularly in the matter of inquiries, but the placement of actual orders is perhaps equally as hesitant. Not much improvement in this respect is looked for until September, but the perceptable gain in inquiries is looked upon as the forerunner of better trade as business gets into its fall and winter stride. The scattering sales now passing reflect pressing need rather than effort to enlarge capacity.

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New York

BOARD of Education, Park Avenue and Fifty-ninth Street, New York, is arranging for installation of industrial shops in 25 junior high schools, for sheet metal and general metal working, machine shop, electrical, automobile repair and other mechanical instruction. Work is scheduled for completion in 12 to 15 months. W. C. Martin, Flatbush Avenue Extension and Concord Street, Brooklyn, is architect.

Petroleum Chemical Corpn., 52 William Street, New York, contemplates plant for production of butanol and kindred products, used in film, lacquer and allied industries, to cost over $200,000. Company is affiliated with National Distillers Products Corpn., same adddress, and Barnsdall Corpn., 59 East Van Buren Street, Chicago.

New York Edison Co., New York, has plans for a power substation at Yonkers, N. Y., to be known as Millwood substation, for high-tension service, estimated to cost more than $250,000 with equipment. Company engineering department is in charge.

Landow Metal Products Corpn., Brooklyn, recently organized by Joseph Landow, 2619 Davidson Avenue, Bronx, New York, and associates, plans operation of local plant for manufacture of metal goods.

Department of Water, Gas & Electricity, Municipal Building, New York, has plans for an equipment storage, service and repair building at St. Nicholas Avenue and 155th Street, to cost about $75,000 with equipment. J. E. Kleist, 25 West Forty-fifth Street, is architect.

Fairchild Aerial Camera Corpn., 270 West Thirty-eighth Street, New York, affiliated with Fairchild Aviation Corpn., 122 East Forty-second Street will carry out expansion in manufacture and will produce speak-o-phone electrical recording instruments and equipment, parts, etc., heretofore manufactured by Speak-O-Phone, Inc., 201 West Forty-ninth Street, which will continue sales and distribution of such equipment. Ernest Robinson is president of Fairchild camera company, and Fred Lutz, vice-president and general manager.

New York & Richmond Gas Co., 691 Bay Street, St. George, S. I., is planning new artificial gas plant at Honeywood, S. I., to cost more than $125,000 with equipment. Company engineering department is in charge.

William J. Marrin, 82-23 165th Street, Jamaica, L. I., and associates have organized Marrin Mfg. & Supply Co., Inc., Brooklyn, with capital of $10,000, and plan operation of plant at Brooklyn for production of tools, marine equipment and other mechanical specialties. Paul A. McLaughlin, 3900 Greystone Avenue, Bronx, New York, is one of incorporators.

Dayton Airplane Engine Co., Dayton, Ohio, has acquired controlling interest in American Aeronautical Corpn., 730 Fifth Avenue, New York, with plant and airport at Manhasset Isle, Port Washington, L. I., where the Dayton company will concentrate production largely in future, and where expansion will be carried out. In conjunction with Edward G. Budd Mfg. Co., Philadelphia, manufacturer of steel automobile bodies, Dayton company has begun production of an amphibian plane constructed of stainless steel. Enea Bossi is vice-president of Dayton company.

M. Hoagland & Sons, Rockaway, N. J., manufacturer of rolling mill machinery, parts, etc., is planning rebuilding of portion of plant recently destroyed by fire. T. Gordon Hoagland is head.

Board of Education, 31 Green Street, Newark, N. J., is asking bids until Aug. 27, for a lathe, vises, metal-cutting shears and punch, beading machine, acid tanks, steel lockers, potters' wheel, blue print machine, electric motors, generator, instruments and other equipment, as per list on file. R. D. Argue is secretary.

Irving Varnish & Insulator Co., Inc., Argyle Terrace, Irvington, N. J., is planning rebuilding of portion of plant recently destroyed by fire. Andrew Young is vice-president.

Adams Nickel Plating Co., Newark, N. J., has been organized with capital of $125,000 to take over and expand company of same name with local plant at 48 Adams Street. John Tenzola and Adolf Behrens are principal incorporators of new company.

Gamon Meter Co., 286-96 South Street, Newark, N. J., manufacturer of water meters, parts, etc., plans rebuilding of portion of plant recently destroyed by fire. George H. Gleeson is vice-president. Same fire also partially destroyed adjoining plant of Emile Snyder, Inc., 298-306 South Street, manufacturer of celluloid products, films, etc., which likewise plans rebuilding. Otto Snyder is head of latter company.

Department of Public Affairs, City Hall, Newark, N. J., Jerome T. Congleton, mayor, director, will receive bids until Aug. 24 for a quantity of corrugated metal pipe, as per specifications at Bureau of Purchase, Room 307.

Philadelphia

FOUR-STORY factory and adjoining buildings at Columbia Avenue and Mascher Street, Philadelphia, have been purchased by Cortright Metal Roofing Co., 2218 Chestnut Street, and will be occupied for new plant.

Philadelphia Electric Co., Philadelphia, has applied for permission to purchase Chester Valley Electric Co., Chester Valley Electric Light, Heat & Power Co., and Coatesville Electric Light, Heat & Power Co., all operating in vicinity of Coatesville and adjacent sections of Chester County, Pa. Acquiring company will consolidate with organization and plans expansion program in district noted, including transmission line construction.

Safety Gas Lighter Corpn., Philadelphia, has leased space in building at Delaware Avenue and South Street, to manufacture gas-lighting equipment.

Bureau of Supplies and Accounts, Navy Department, Philadelphia and Washington, is asking bids until Sept. 1 for 150 gasoline pumps and 75 fuel hand pumps for Philadelphia Navy Yard.

Department of Forests and Waters, Capitol Building, Harrisburg, Pa., will receive bids until Sept. 1, for construction of a dam at Pymatuning, in conjunction with river project for which an appropriation of $1,500,000 has been made.

Penn Tack Co., Norristown, Pa., plans rebuilding part of plant recently destroyed by fire.

Charles J. Dunkle, 1900 Derry Street, Harrisburg, Pa., and associates have organized Fuel Economizing Corpn., to operate local plant for manufacturing mechanical blowers, heating and temperature control devices, and kindred equipment. J. M. Dunkle will be an official of new company. D. Eugene Shenk, Palmyra, Pa., is treasurer.

New Jersey State Highway Department, State House Annex, Trenton, N. J., A. Lee Grover, chief clerk, is asking bids until Aug. 31 for 310 tons of steel castings.

State Purchasing Department, State House Annex, Trenton, N. J., is negotiating for purchase of part of former local plant of Ajax Rubber Co., North Olden and Breunig Avenues, and will remodel and equip for new storage and distributing plant for State equipment.

Frankford Lighting Fixture Manufacturers, Inc., Philadelphia, has been organized to acquire and expand company of same name with local plant at 4273 Frankford Avenue. Jacob N. Samson is treasurer.

Board of Education, Philadelphia, is considering installation of manual training equipment in three-story and basement junior high school, 175 x 290 ft., to cost over $600,000, for which plans are being drawn by Irwin T. Catharine, Architects Building, architect. Edward Merchant, Nineteenth and Ludlow Streets, is business manager for board.

Peoples Gas Co., Glassboro, N. J., has secured permission to issue new capital stock of $750,000 par value, part of fund to be used for extensions and improvements in plant and system.

Harrisburg Pipe & Pipe Bending Works, Harrisburg, Pa., has developed a new forged steel tractor shoe for road tractor service, in cooperation with Cleveland Tractor Co., Cleveland, and will develop commercial production at plant for order recently secured from State Highway Department.

ANNOUNCING

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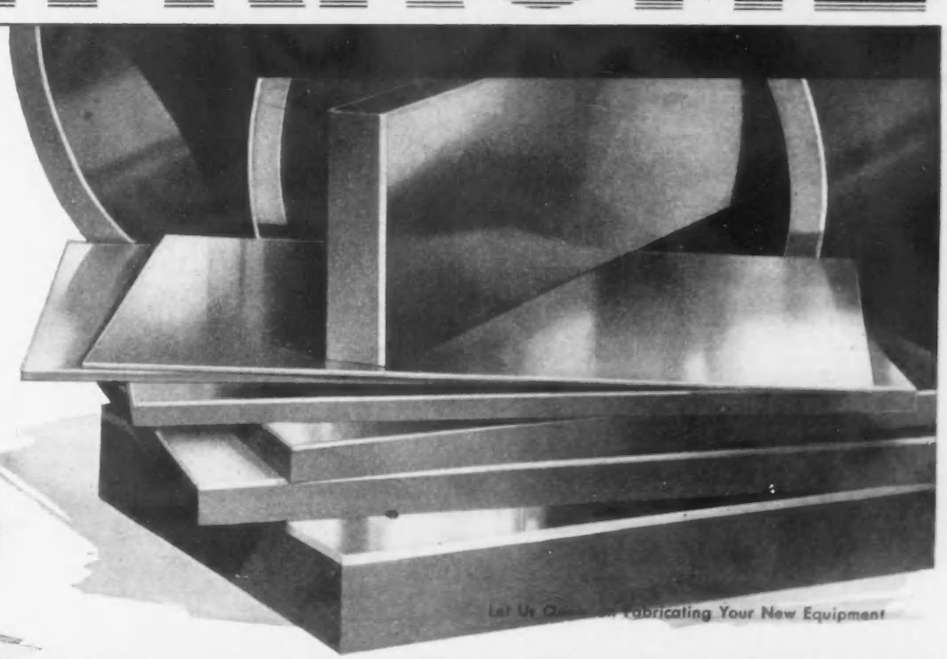

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South Atlantic

BOARD of District Commissioners, District Building, Washington, is asking bids until Sept. 2 for sheet metal and woodworking shop equipment for local schools, including three lathes, three grinders, three planers and pointers, three sanders, three saw benches, 45 woodworking benches, etc.; until Aug. 24 for print shop equipment, including three job printing presses, two paper cutters, three lead cutters, six racks and other equipment; until Aug. 31 for registers and take-up reels; until Sept. 4 for horizontal return tubular boilers.

Dietrich Brothers, 220 East Pleasant Street, Baltimore, iron and steel fabricators, have plans nearing completion for one-story fabricating shop, 200 x 400 ft., to cost about $100,000 with equipment, including machinery for punching and assembling structural steel shapes, etc. Unit will include three crane runways.

Virginia-Carolina Chemical Co., Richmond, Va., has awarded general contract to Austin Co., Euclid Avenue, Cleveland, for first unit of new branch plant for manufacturing commercial fertilizers at East St. Louis, Ill., to be one story, 160 x 400 ft., estimated to cost more than $100,000 with equipment. Completion is scheduled by Dec. 1. It is proposed to build other units later.

Bureau of Yards and Docks, Navy Department, Washington, will receive bids until Sept. 23 for steel hangar, 310 x 1138 ft., and 198 ft. high inside, at new airship base at Sunnyvale, Cal., including repair, service and parts shops and other mechanical departments, with each door leaf weighing 600 tons to be operated by a 250-hp. motor. Estimated cost approximates $1,500,000 with equipment. Other hangars, shops and field units are projected at same location at later date. Bureau is also asking bids (no closing date stated) for a crane for Newport, R. I., navy yard, as well as bids for screens (no closing date stated) for Mare Island, Cal., yard.

City Water Department, Portsmouth, Va., plans to electrify main pumping plant for municipal waterworks, estimated to cost about $50,000 with equipment. City engineering department will be in charge.

Department of Public Buildings and Public Parks, Navy Building, Washington, Col. U. S. Grant III, director, is asking bids until Aug. 28 for seven-story and basement storage and distributing plant on local site, for Federal equipment service, estimated to cost $1,000,000 with mechanical equipment. Lockwood, Greene Engineers, Inc., 100 East Forty-second Street, New York, is consulting engineer.

Interstate Granite Corpn., 607 West Seventh Street, Charlotte, N. C., has awarded general contract to Goode Construction Co., 11 East Fifth Street, for one-story stone and granite-working plant, with main unit, 40 x 250 ft., on Hutchinson Street, estimated to cost about $90,000 with machinery. A 20-ton electric overhead traveling crane will be installed. R. E. Scoggins is president.

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New England

PLANS are under way by Berger Brothers Co., Derby Avenue, New Haven, Conn., manufacturer of surgical apparatus, for a five-story addition, 40 x 120 ft., with improvements in present factory, estimated to cost more than $80,000 with equipment. Douglas Orr, New Haven, is architect.

American Brass Co., Waterbury, Conn., has plans for a two-story addition to plant on Canal Street, Ansonia, Conn., to cost about $45,000 including equipment.

C. Drew & Co., Inc., Kingston, Mass., has been organized with a capital of $100,000, to acquire and expand company of same name with local plant for manufacture of mechanics' tools, ship equipment, etc. Robert E. Ford is president, and Charles H. Drew treasurer.

Massachusetts National Guard Air Corps, Boston, will soon take bids through C. F. Springall, Malden, Mass., architect, for hangar, 111 x 168 ft., with repair and reconditioning shops, administration unit, etc., at Boston municipal airport. A fund of $250,000 has been arranged for building and equipment. J. T. Whitney, Boston, is engineer.

Bethlehem School District, Bethlehem, N. H., is considering installation of manual training equipment in two-story and basement high and grade school to cost about $160,000, for which bids are being asked on general contract. H. H. Owen, 3 North State Street, Concord, N. H., is architect.

Lawrence Braiding Machine Co., Inc., Lawrence, Mass., recently formed by Leo M. Trilling, 61 Stearns Avenue, and associates, plans operation of local plant for manufacturing special machinery and parts. Mr. Trilling is treasurer, and John Bolten, president.

Sewer Department, Worcester, Mass., S. H. Brooks, Jr., superintendent, has asked bids on general contract for a three-story equipment and mechanical shop at East Worcester, 50 x 175 ft., to cost more than $125,000 with equipment. R. C. Gorrani, 175 Green Street, is architect.

Segal Lock & Hardware Co., Hartford, Conn., has contracted for automatic razor blade production equipment, and plans to increase production to 600,000 to 800,000 blades daily by the end of 1931.

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Pittsburgh

CONTRACT has been let by Pressed Steel Car Co., Farmers Bank Building, Pittsburgh, to Austin Co., Euclid Avenue, Cleveland, for plant at 136th and Brandon Streets, Chicago, to replace local works destroyed by fire some time ago. Project will consist of six one-story buildings, with main unit, 90 x 360 ft., to cost more than $500,000 with equipment. Contractor will also engage as architect and engineer for plant.

United States Engineer Office, Pittsburgh, is asking bids until Aug. 25 for one 40-hp. locomotive type boiler and one internally-fired Scotch type boiler; until Sept. 1 for docking and repairing floating plant of local United States Engineer district.

Pittsburgh Cut Stone Co., 5116 Cypress Street, Pittsburgh, has awarded general contract to F. Hoffman Co., 901 Wood Street, for new one-story plant, 170 x 200 ft., to cost about $60,000 with equipment. Part of unit will be two-story. Hunting, Davis & Dunnells, Century Building, are architects.

Ridgway Natural Gas Co., Ridgway, Pa., has acquired Consumers Gas & Heat Co., Johnsonburg, Pa., including gas properties, pipe lines, franchises, etc. Purchasing company contemplates expansion program, including pipe lines.

Albert Packing Co., Cecil, Pa., is planning rebuilding part of meat-packing plant recently destroyed by fire.

West Virginia Water Service Co., Charleston, W. Va., has arranged for a bond issue of $930,500, part of proceeds to be used for extensions and improvements in plants and system.

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Buffalo

NEW YORK Power Authority, Albany, N. Y., Frank P. Walsh, chairman, recently created to construct and operate a State-owned hydroelectric generating plant at Massena Point, St. Lawrence River district, United States and Canada, has plans for initial development work, including power dam, etc., and intends to begin operations by end of year. A fund of $171,000,000 will be used for complete project, of which at least $50,000,000 will be expended for machinery and materials.

Huron Natural Gas Corpn., Olean, N. Y., recently organized by James Cranides, 418 West Henley Street, and associates, with capital of $1,000,000, plans development and operation of natural gas properties in Wayne-Dundee gas fields, including wells, pipe lines, distributing system, etc. Walter D. Howe, 107 North Clinton Street, will be one of heads of new company.

New York State Electric & Gas Corpn., Ithaca, N. Y., has arranged for a bond issue of $7,000,000, a part of proceeds to be used for expansion and improvements in plants and system.

Board of Education, Fayetteville, N. Y., plans installation of manual training equipment in three-story high school to cost about $380,000, in which amount bonds have been voted. Bids have been taken on general contract and work on superstructure will begin promptly. Carl C. Ade, 89 East Avenue, Rochester, N. Y., is architect.

Ward Van Gilder, Nunda, N. Y., and associates have organized Nunda Process Co., with capital of $10,000, and plan operation of local plant for manufacturing special machinery, including machines for cementing leather on shoes. Samuel Muscarolla, Nunda, is interested in new company.

Beebe Island Corpn., Watertown, N. Y., an interest of Knowlton Brothers, operating a local paper mill, New York Air Brake Co., Watertown, and other industrial interests, plans to expend sum of about $800,000 on proposed local hydroelectric generating station on Beebe Island, on which work has begun. Transmission lines will serve the two companies mentioned and other local plants. Part of the output will be sold to Niagara-Hudson Power Corpn., Buffalo. Plant will be equipped for 8000 kw. initial capacity and is scheduled for completion by close of year.

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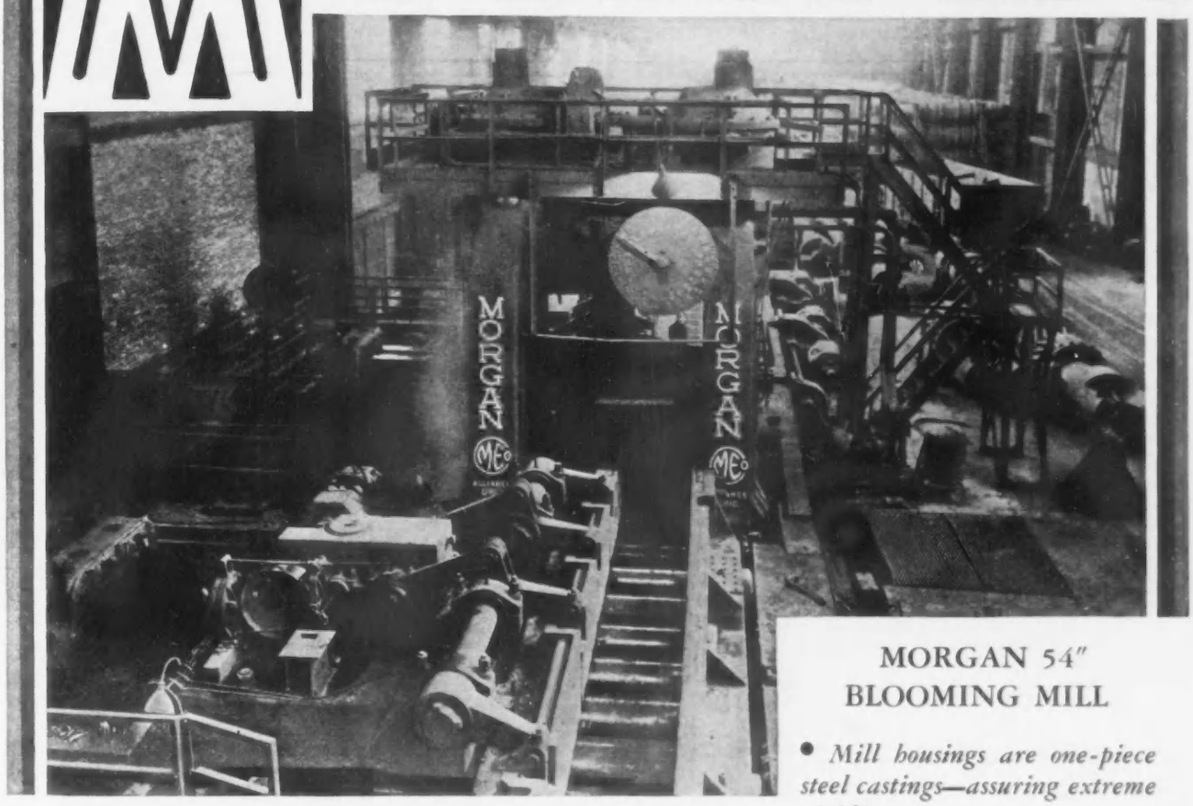
Cincinnati

BIDS have been asked on general contract by Homan Plating Co., Second and Taylor Streets, Dayton, Ohio, for one-story addition, 75 x 105 ft., to cost more than $40,000 with equipment. William J. Huhn, 204 McClure Street, is architect.

Contracting Officer, Wright Field, Day-

MORGAN



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ton, Ohio, will receive bids until Aug. 26 for one motor-driven bench machine, one motor-driven internal grinder and one motor-driven wood shaper; until Aug. 25 for light, switch and panel assemblies, socket and guard plates.

Holston River Power Co., Johnson City, Tenn., has secured hearing before State board, Richmond, Va., on Sept. 11, to secure permission to construct power dam on Holston River, Washington County, Va., and in vicinity of Kingsford, Tenn., for proposed hydroelectric generating plant service. Company engineering department is in charge.

Grayson Water Co., Grayson, Ky., is asking bids until Aug. 27 for equipment for local water system, including pumping machinery, filter equipment, 100,000-gal. capacity steel reservoir, pipe lines, etc. Howard K. Bell, McClelland Building, Lexington, Ky., is consulting engineer.

Board of Education, Beaver Creek Rural School District, Beaver Creek Township, Green County, Ohio, contemplates installing manual training equipment in new two-story and basement high and grade school, for which bids are being asked on general contract until Aug. 25. Walker & Norwick, American Building, Dayton, Ohio, are architects.

General Iron Works Co., 1221 Front Street, Cincinnati, and Frigidaire Corpn., Dayton, Ohio, have arranged for joint production at first-noted plant of new air conditioning system, to be known as "Hot-Kold," for domestic service, including automatic gas-fired equipment of forced air type with air-cooling equipment for circulating air ducts. Parts and assembling will be carried out by General Iron Works.

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Milwaukee

TENDERS are being received until Aug. 27 by William E. O'Brien, city manager, Kenosha, Wis., for furnishing and installing two 15,000,000-gal. daily motor-driven pumping units, one high and one low lift, with necessary priming pump, selector, motor control and 26,400-volt outdoor transformer substation complete, in connection with enlargement of municipal waterworks plant, requiring also 635 tons of 16 to 24-in. pipe, bids on which will be opened at same time.

Nordberg Mfg. Co., Milwaukee, has booked order from Cerra de Pasco Copper Corpn., Lima, Peru, for large double-drum electric hoisting engine with lifting speed of 1800 ft. per min. for use in a 2200-ft. vertical shaft in Andes Mountains.

C. B. Fritz Co., Madison, Wis., is lowest bidder at $727,548 for general work on new United States Forest Products Laboratory at University of Wisconsin, Madison, on new tenders on revised specifications opened at Department of Agriculture, Washington, on Aug. 11. First bids were rejected as exceeding appropriation. Sum available for building, machinery, etc., is $900,000.

Pneumatic Gas Stopper Co. has been organized, with $25,000 capital stock at Manitowoc, Wis., by Victor and George Ankarlo of Milwaukee and Edward Meyer, local, to manufacture valves designed to stop leaks in gas lines automatically. Product will be marketed through gas companies.

Great Lakes Dredge & Dock Co., 228 Plymouth Building, Minneapolis, Minn., has placed general contract with Peppard & Fulton Co., 1507 Tower Avenue, Superior, for construction of new timber and concrete coal dock, 200 ft. long, at Superior, to cost about $140,000.

Northern Corrugating Co., Green Bay, Wis., has disposed of its roofing and sheet metal contracting division to group of employees who have incorporated the Northern Metal & Roofing Co., with $15,000 capital stock. New company will conduct operations in present space of department in Corrugating company's plant. Frank Hurckman is president; Matt Van Laanen, vice-president; H. J. Martin, secretary, and Arthur Du Fresne, treasurer.

Schuette Construction Co., Manitowoc, Wis., is low bidder at $177,000 for erecting new Manitowoc Vocational School, 80 x 230 ft., and 53 x 100 ft., all two stories and basement. With shop tools and other equipment investment will be approximately $250,000.

Allis-Chalmers Mfg. Co., West Allis, Milwaukee, has placed contracts for erection of a five-story addition, 60 x 116 ft., to administration building of tractor division at main works to accommodate executive divisions of Advance-Rumely Co., Peoria, Ill., recently acquired.

Milwaukee Sewerage Commission, Jones Island, is taking bids until Aug. 21 for furnishing and installing four new horizontal surface condensers and necessary appurtenances and removal of four jet condensers in power plant of main sewage disposal plant. J. L. Ferebee is chief engineer.

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Detroit

TRACT of about 365 acres in Lake County, near Cleveland, is being acquired by Ford Motor Co., Dearborn, Mich., as site for proposed assembling plant. Project will consist of group of one-story units with power house and other mechanical structures, as well as wharf on Grand River with mechanical-handling, loading and other equipment for handling large lake steamers. It is estimated to cost more than $5,000,000 with machinery.

Bond Falls Hydro-Electric Co., Ontonagon, Mich., now being organized by Harry A. Bond, Green Bay, Wis., and associates, plans hydroelectric generating plant on Ontonagon River, near Ontonagon, to cost more than $350,000 with transmission system. Mr. Bond will be president.

Szekely Aircraft & Engine Co., Holland, Mich., is considering an expansion program for increased production facilities, to be completed by close of year. O. E. Szekely is president.

Frank Fales, Saginaw, Mich., and Glenn Larsen, Manistee, Mich., have organized Manistee Paper Box Co., Manistee, to manufacture folding paper boxes and containers. Company will acquire and will remodel and improve Manistee plant of American Paper Box Co.

Wolverine Sheet Metal & Ventilating Corpn., 6501 Mack Avenue, Detroit, recently organized by Frank Seymour, 14216 Kentucky Avenue, and associates, plans operation of local sheet metal works for manufacturing ventilating and other equipment. Bartley Turner, St. Clair Shores, Mich., is interested in company.

Continental Motors Corpn., Muskegon, Mich., manufacturer of automobile engines, parts, etc., will concentrate production at local plant, discontinuing such engine manufacture at works at 12801 East Jefferson Street, Detroit, which will be continued for production of airplane motors and engineering tool department. General offices will be maintained at latter plant. W. R. Angell is president.

Board of Trustees, Michigan Institution for Deaf, Flint, Mich., has awarded a general contract to K. B. Foster, Flint, for addition to industrial building, to cost about $60,000 with equipment. Plans are under way for another three-story mechanical unit, to cost about $100,000 with equipment. Mackenzie & Pratt, Flint, are architects.

Stockholders of the Willard Metallic Vault Co., Willard, Mich., have voted to issue $25,000 of nonvoting common stock to devise means for an expansion program.

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Chicago

BIDS are being asked by Construction Division, Veterans' Bureau, Washington, until Sept. 1 for additions to refrigerating plants at veterans' hospital at Hines, Ill.

Interstate Iron Mining Co., Virginia, Minn., has asked bids on general contract for three one-story additions to plant at Hibbing, Minn., for storage and distributing service, estimated to cost about $60,000 with equipment.

National Light & Power Co., operated by Iowa Southern Utilities Co., Centerville, Iowa, is concluding purchase of Brandon Power, Gas & Steam Heating Utilities, Brandon, Man., Canada, for $1,398,000 and will operate properties in conjunction with electric light and power plant and system at Moosejaw, Man., as well as other Canadian utility interests. Acquiring company is considering an expansion and improvement program.

City Council, Pella, Iowa, A. C. Kuyper, city clerk, is asking bids until Sept. 2 for equipment for municipal electric light and power plant, including a 750-kw. steam turbo-generator, condenser, cooling tower and auxiliary equipment.

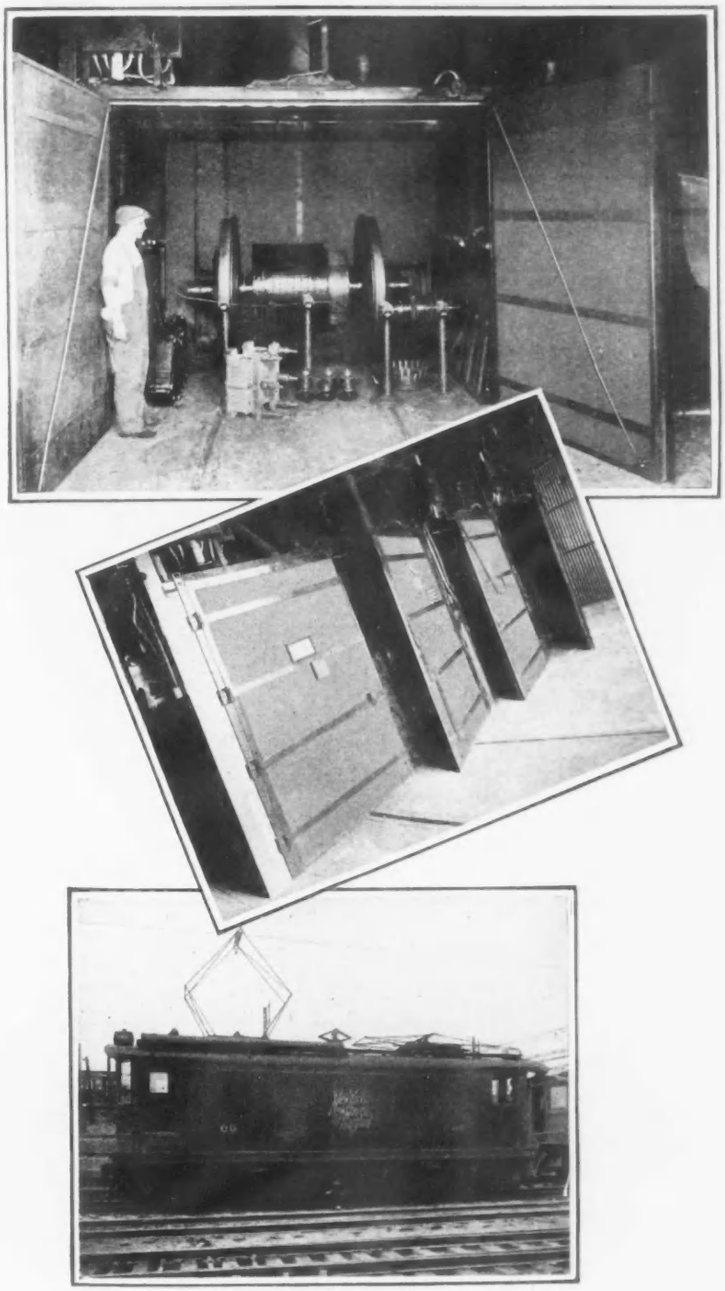
Central Gear Products Corpn., 2124 Marshall Boulevard, Chicago, recently organized by C. C. Issacson and W. E. Kane, plans operation of local plant for manufacturing small gears and gearing systems.

Brown & Bigelow, Inc., University and Syndicate Avenues, St. Paul, Minn., advertising novelties, etc., has engaged Toltz, King & Day, Inc., Builders' Exchange, architect, to prepare plans for a three-story and basement plant to cost about $250,000 with equipment. It is expected to ask bids on general contract late in fall. Charles A. Ward is general manager.

Abart Gear Machine Co., 4826 West Sixteenth Street, Cicero, Chicago, recently organized by Joseph Minarik and associates, with capital of $20,000, plans operation of local plant for manufacturing gear-cutting machines, gears, etc. Albert Klima, Chicago, is one of incorporators.

Allied Steel Casting Co., West Harvey, Ill., will begin construction immediately on a new crane runway and storage and cleaning room, thereby covering its entire acreage with buildings.

Armatures ranging from a few pounds to 7½ tons are baked in these Crawford Ovens



In one of the largest armature departments of any railroad in the country, these three electrically heated Crawford Ovens are baking armatures, field coils, and other parts on a continuous 24 hour schedule.

The smallest piece weighs but a pound, the largest 7½ tons.

Day after day these Crawford Ovens must do their work without fail, and without interruption, at low operating cost.

Any failure of any part of the oven to function properly might mean the failure of an electric locomotive at a critical time.

These ovens, in continuous operation since 1926, have proven the reliability and soundness of Crawford engineering and construction.

If you need ovens for this kind of work, or for baking finishes on metal, drying, lacquering, or any other baking operation, you can obtain no finer oven than this.

For any baking operation up to 800° F. and for any kind of fuel.

You should know all about Crawford Ovens, so send the attached coupon.

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Cleveland

PLANS are being considered by Smolensky Valve Co., Engineers Building, Cleveland, for a new three-story and basement factory, 45 x 100 ft., to cost more than $75,000 with equipment. Michael Smolensky is president.

International Harvester Co., Chicago, has asked bids on general contract for a one and two-story factory branch, storage, distributing and service building, 160 x 176 ft., and 175 x 214 ft., at Toledo, Ohio, to cost about $150,000 with equipment. Company engineering department is in charge. John Hupman, 384 South Erie Street, Toledo, is local branch manager.

Mansfield Metal Vault Co., Mansfield, Ohio, care of G. E. Kalbfleisch, 402 Richland Trust Building, recently organized by Elmer Hedeen and H. B. Turner, with capital of $25,000, plans operation of plant for manufacturing metal plate products.

Board of Education, Strasburg, Ohio, contemplates installation of manual training equipment in new two-story senior and junior high school to cost about $100,000, for which plans are being drawn by R. F. Medicus Engineering Co., Home Savings and Loan Building, Youngstown, Ohio, architect and engineer.

D. E. Morgan, city manager, New City Hall, Cleveland, has plans under way for one and two-story municipal repair and service plant, to cost about $60,000 with equipment. City engineering department, New City Hall, is in charge.

Peerless Motor Car Corpn., Quincy and East Ninety-third Streets, Cleveland, is arranging plant facilities for production of new line of 12 and 16-cylinder automobiles of special heat-treated aluminum throughout, including motors, pistons, frames, connecting rods and other parts. Entire cars, including bodies and engines, will be constructed at local plant.

Cooper-Bessemer Corpn., Mount Vernon, Ohio, has repurchased the Chapman Gas Producer Division of the former Chapman-Stein Co. from the Surface Combustion Co., Toledo, Ohio, which acquired the Chapman division in October, 1930.

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St. Louis

NEW company has been organized by C. E. Haggerty, Oklahoma City, Okla., and associates, under name of Air Wash Co., to manufacture patented mechanical domestic washing equipment. Company has acquired property at Lee Avenue and Second Street and will provide facilities for initial monthly capacity of 4000 to 5000 machine units, including parts and assembling.

City Council, Pryor, Okla., has authorized plans for a municipal electric light and power plant, to cost more than $70,000 with machinery. V. V. Long & Co., Colcord Building, Oklahoma City, Okla., are the consulting engineers.

Solid Steel Scissors Co., Fort Smith, Ark., plans rebuilding part of plant recently damaged by fire. H. J. Miller is president.

Union Electric Light & Power Co., St. Louis, has secured permission to issue new common stock in amount of $7,500,000, portion of proceeds to be used for expansion and improvements in plants and system.

State Board of Affairs, State Capitol Building, Oklahoma City, Okla., has awarded general contract to H. W. Underhill Construction Co., Braniff Building, for first of five industrial buildings to be constructed at State institute for deaf and blind negroes, Taft, Okla., to be one story and basement, 40 x 100 ft. Entire project will cost $125,000 with equipment. Layton, Hicks & Forsyth, Braniff Building, is architect.

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Gulf States

PLANS have been authorized by Southwestern Gas & Electric Co., Shreveport, La., for high-tension, steel superstructure power substation at Overton, Rusk County, Tex., for service in East Texas oilfields, estimated to cost more than $175,000 with transmission lines. Power supply will be secured from Texas Power & Light Co., Dallas, Tex., which is building a high-tension power line from Trinidad, Tex., to Overton. Company engineering department is in charge.

Benjamin N. Garrett, Sheldon, Tex., and associates are planning early construction of a new wood distillation plant near San Jacinto River, where 6000 acres has been secured. Inquiries for prices on machinery are now being sent out.

Texas Pipe Line Co., Texas Building, Houston, Tex., operated by Texas Oil Co., same address, is planning early rebuilding of pumping plant at San Augustine, Tex., recently destroyed by fire. Engineering department is in charge.

United States Engineer Office, Mobile, Ala., is asking bids until Aug. 31 for one direct-connected Diesel engine generating plant complete.

New plant being constructed at Bossier City, La., by W. P. Lincoln, referred to in these columns last week, will be occupied by Lincoln Tank Works, Electra, Tex., of which Mr. Lincoln is head, for production of steel tanks and other plate products. It will be one story, 110 x 225 ft. Company will remove present works from Electra to new location and increase capacity, particularly in line of welded steel tank units for oil storage service.

Danciger Oil & Refining Co., W. T. Waggoner Building, Fort Worth, Tex., and Pampa, Tex., has awarded general contract to Southwestern Engineering Co., Longview, Tex., for new oil refining plant near Longview, to cost about $200,000 with equipment.

Board of Education, School District No. 18, Navarro, Tex., has authorized installation of a vocational training department in new two-story high school in Mildred district, to cost about $100,000, for which general contract has just been let to Mentzel & Wood, Sherman, Tex.

Sinclair Oil Co., Houston, Tex., with headquarters at 45 Nassau Street, New York, has acquired about 13 acres near Jacksonville, Tex., as site for electric-operated pumping plant for oil pipe line service, estimated to cost about $100,000 with machinery.

Moran Tank Works, Inc., Arkansas and Ricon Streets, Shreveport, La., manufacturer of steel tanks and other plate products, is considering an expansion program for increased output.

Indian State Oil Co. of Texas, Inc., Dallas, Tex., operating local chain of Callaway Service Stations, recently acquired, has work under way on new oil refining plant at Gladewater, Tex., to cost more than $100,000 with equipment. Company is also planning to establish a new refining plant in Dallas district in near future to cost upward of $100,000. Company is affiliated with Indian State Oil Co. of Oklahoma, Inc., Oklahoma City, Okla. John W. Sappington is president.

Construction Quartermaster, Fort Sam Houston, Tex., is asking bids until Aug. 24 for four engineering shops at Duncan Field, Tex., comprising main engineering shop, one story, 448 x 560 ft.; one-story boiler plant, 24 x 74 ft.; one-story dope house, 22 x 260 ft.; and one-story oil storage and distributing building, 66 x 66 ft.

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Indiana

CONTRACT has been let by Zollner Machine Co., Duluth, Minn., Theodore Zollner, president, to Buesching & Hagerman Co., 402 East Superior Street, Fort Wayne, for one-story plant, 50 x 150 ft., at Fort Wayne, to cost about $45,000 with equipment.

Air Jack Mfg. Co., Inc., Fort Wayne, recently organized by Joseph P. Finan and P. W. Donahue, Jr., Fort Wayne, and associates, plans operation of local plant for manufacture of automobile and airplane jacks, and other mechanical equipment.

Indiana State Highway Commission, Statehouse Annex, Market and Senate Avenues, Indianapolis, is asking bids until Aug. 26 for 16 to 30 air compressors, two to 10 mud jacks, one to six tank car heaters, 10 to 20 heavy V-type snow plows, six to 15 5-ton three-wheel rollers, 30 to 50 light single-blade snow plows, eight to 20 heavy single-blade snow plows, eight to 12 5 to 10-ton trailers, 10 to 20 tar heating kettles, two to 10 four-wheel tractors, one to five 5-ton crawler-type tractors, and other machinery. J. J. Brown is director.

Board of Public Works, Fort Wayne, is asking bids until Sept. 3 for addition to steam power department of municipal electric light plant, including two boilers and complete auxiliary equipment, estimated to cost about $250,000. Froelich & Emery, Second National Bank Building, Toledo, Ohio, is consulting engineer.

Pendleton Water Co., Pendleton, plans installation of deep-well pumping machinery and accessory equipment in connection with a local water supply system. Harry L. Tirsway is president.

Akron Foundry, Rochester, Ind., has been purchased by James L. Shank, Elkhart, Ind., and R. E. Hamilton, South Bend, Ind. The plant has not been operating for several months, but the new owners plan to melt iron about Aug. 20.

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Pacific Coast

PLANS have been filed by Pacific Gas & Electric Co., 245 Market Street, San Francisco, for a new power substation for high-tension service, to cost about $90,000 with equipment. Company engineering department is in charge.

Ontario-Cucamonga Citrus Growers' Exchange, Ontario, Cal., Harry B. Harlow, manager, is considering construction of central ice and precooling plant at Upland, Cal., to cost more than $60 000 with mechanical blowers, compressor, re-

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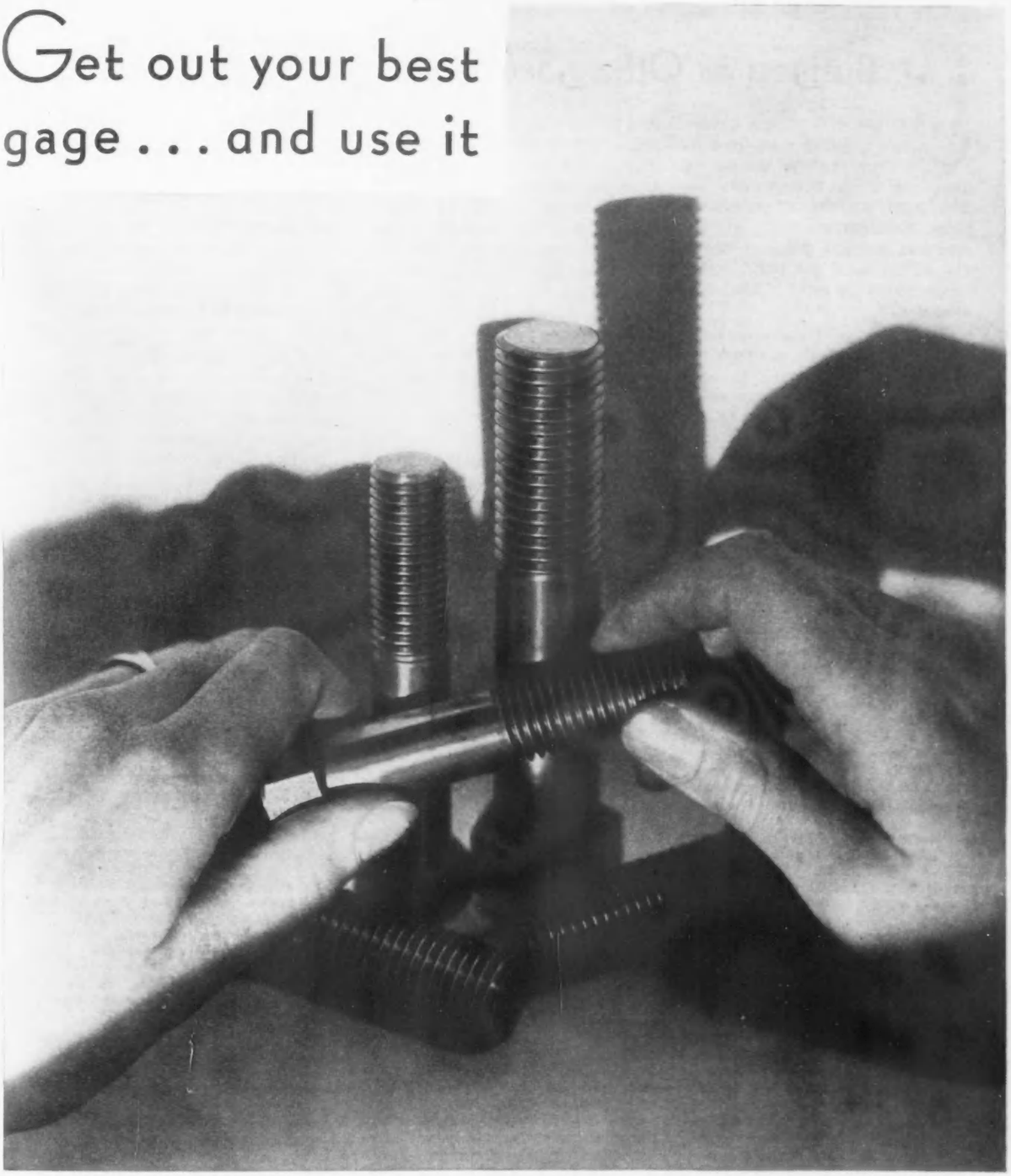

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CLEVELAND CAP SCREWS

Business as Others See It

Digest of Current Financial and Economic Opinion

CONDITIONS in the United States, rather than those in Europe, featured the week's discussion of the business outlook. The good promise of sustained price stabilization came in for comment, but low prices of wheat and cotton were the chief object of discussion by most of the commentators.

General wage reductions as a help to bring about a return to activity were mentioned in only one case and that with doubt as to how effective they would be, at least among manufacturers of capital goods, although letters and other expressions of that class of manufacturers show a distinct disposition to favor cuts in the early future.

The farmers' dilemma is described as about such, with no noteworthy suggestions vouchsafed as to what revision in forecasts may be necessary to cover the effects on industry.

Little of the specific is offered to show that the bottom has been reached. Theodore H. Price, in *Commerce and Finance*, believes nevertheless that things are picking up and asserts that it is "certain that more people are at work, and that the reduced cost of living has enabled a great many to buy more than they could obtain for the same money a year ago."

The state of waiting, says the Alexander Hamilton Institute, may be tedious but "it is at least less trying than a continuation of the downward movement." And Poor's stock market *Bulletin* holds that "the recovery that has already occurred in a few leading individual industries goes a long way to prove that a revival in general business need not necessarily wait for a general rise in commodity markets."

As possibly marking the beginning of cyclical expansion, the Alexander Hamilton Institute points to the increase in commercial loans that has been in evidence during the past two months.

Another indicator, the production of consumer goods, which, according to Dr. Leonard P. Ayres, Cleveland Trust Co., has proved, so far in this depression, a better guide than the output of producer goods, does not now yield any reliably hopeful signs about the bottom of the depression, though he admits some encouraging recent increases in the production of such goods as textiles, shoes and tires.

frigerating equipment and other machinery.

Board of Directors, Santa Barbara State Teachers' College, Santa Barbara, Cal., has rejected all bids recently received for a three-story science building, and will ask new bids on general contract at early date. Cost is estimated at more than $200,000 with industrial, engineering, chemical and other equipment. George M. McDougall, Public Works Building, Sacramento, Cal., is architect.

Safety-Drop Ladder Corpn., Los Angeles, care of A. L. Wissburg, Sierra Madre, Cal., attorney, recently organized with capital of $75,000 by Earl A. Nelson, 406 South Second Street, Alhambra, Cal., and associates, plans operation of plant at Los Angeles for manufacture of patented ladders and kindred mechanical equipment.

Board of Education, Sacramento, Cal., Charles Hughes, superintendent, has asked bids on general contract for a one-story addition to high school, to be equipped as a manual training shop for metal-working, woodworking, automobile repair instruction and other departments, for which list of tools and equipment will soon be arranged. It will cost about $60,000. Jens C. Petersen, 826 Twenty-sixth Street, is architect.

Pacific Hoist & Derrick Co., 818 First Street South, Seattle, has awarded general contract to General Construction Co., Colman Building, for one-story storage, distributing and service building, to cost about $40,000 with equipment. William Jones, Lumber Exchange Building, is architect.

Ward Heater Co., Ltd., Los Angeles, is building a new factory at 1800 West Washington Boulevard, at a cost of $125,000 inc'uding equipment.

Douglas Aircraft Corpn., Santa Monica, Cal., has been awarded contract for 30 observation planes for War Department, at a cost of $394,259.

Fisher Governor Co., Marshalltown, Iowa, manufacturer of automatic controlling devices for steam, air, gas, oil, etc., has established an assembly plant at 1015 Santa Fe Avenue, Los Angeles.

Canada

CAMERON LUMBER CO., 355 Garbally Road, proposes to start work early next spring on the erection of a sawmill at Victoria, B. C., to cost $75,000.

Following contracts have been awarded in connection with $20,000,000 power development plant at the Abitibi Canyon, Ont., for the Abitibi Power & Paper Co., Ltd., 88 University Avenue, Toronto, Ont. General contractor, Dominion Construcion Co., Ltd., 217 Bay Street, Toronto; closure gates, Dominion Bridge Co., Ltd., 1139 Shaw Street, Toronto; five 65,000-hp. turbines, Canadian Allis-Chalmers, Ltd., 212 King Street West, Toronto; fifteen 55,000-kva. transformers, Canadian General Electric Co., 212 King Street West, Toronto; transmission cable, Aluminum Co. of Canada, Ltd.; 115 miles of 4¼-in. steel ground wire, Canada Wire & Cable Co., Ltd., Leaside, Ont.; towers, Canadian Bridge Co., Ltd., Walkerville, Ont. Bids are being received for switching and control equipment.

Orillia Water, Light & Power Commission, Orillia, Ont., is in the market for deep-well pumps and all electrical equipment for daily water supply of 2,000,000 gal. R. H. Starr, West Street, is engineer.

B. C. Electric Railway Co., Carrall and Hastings Streets, Vancouver, B. C., will start work at once on the erection of a gas plant to cost $850,000. General contract has been awarded to Gas Chamber & Coke Ovens, Ltd., London, England. Bids for other units including wharf, coal handling and blending plants will be called soon. Units to be erected later will include condensers, exhausters, scrubbers and purifiers. J. Keillor is engineer.

Foreign

PLANS are under way by Basle Storehouse Co., Basle, Switzerland, for a new cold storage and refrigerating terminal for food products and perishable merchandise, consisting of group of units to cost more than $500,000 with machinery, including elevating, conveying and other mechanical-handling equipment; refrigerating and power machinery, etc. Swiss railroads, as well as other railroads in Germany and France, are interested in project.

Pan-American Airways, Inc., 122 East Forty-second Street, New York, has arranged for purchase of substantial interest in Sociedad Colombo-Alemana de Transportes Aereos, Barranquilla, Colombia, known as SCADTA, operating a general air service, with airport, shops and mechanical units at last-noted place. Purchasing company will operate in conjunction with SCADTA system, including air mail service, and will develop increased aircraft equipment and operating facilities, including airports, etc. J. T. Trippe is president of Pan-American company; Peter P. von Bauer is general director of SCADTA.

Chamber of Agriculture, Melbourne, Australia, is arranging plans for bulk-handling of wheat, to include construction of group of about 132 elevators in Victoria, varying in capacity from 50,000 to 250,000 bu., with gross rating of 13,000,000 bu. Units will be equipped with elevating, conveying, screening and other equipment, as well as mechanical-loading equipment to operate on basis of 60 tons per hr.